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TARIFFS, THE TERMS OF TRADE, AND THE DISTRIBUTION OF NATIONAL INCOME

LLOYD A. METZLER

I

THE classical concept of the gains from international trade was essentially a concept of increased productivity. The gains from trade, in the classical view, consisted of an increased output of all goods and services, made possible through specialization and exchange. In other words, the classical "law of comparative advantage" demonstrated that, with a given amount of productive resources in every country, it was possible, by an interchange of goods, for all countries to consume more of all commodities. In addition to its description of the potential gains from trade, the classical theory, from the time of John Stuart Mill, also gave an excellent account of how these gains are actually divided among different countries. Stated more broadly, the theory of reciprocal demand, which was added to the classical doctrine by Mill, indicated how international exchange affects the distribution of world income among countries.[1] With its strong emphasis upon productivity and upon the division of the gains from trade between different countries, however, the classical doctrine, as well as the subsequent theoretical work of neoclassical economists, seriously neglected the closely related problem of how international trade affects the division of income within each country among the various factors of production.[2] The classical theory and its neoclassical refinements could show well enough how a country, considered as a unit, tends to benefit from specialization and trade; but these doctrines had very little to say about how the gains of real income within each country are divided among labor, capital, and land.[3]

[1] J. S. Mill, *Essays on Some Unsettled Questions of Political Economy* (1844), Essay I.

[2] In view of the fact that the marginal-productivity theory of distribution did not appear until late in the nineteenth century and in view, further, of the generally recognized opinion that even the present theory of distribution has many deficiencies, it is perhaps not surprising that the influence of international trade upon the distribution of income was inadequately discussed by the classical economists. But, even with due allowances for the backward state of distribution theory, the lag in the development of this aspect of international trade was surprisingly long.

[3] Although the question of income distribution arose early in the nineteenth century in the English

The division of the gains from trade among the different factors of production or, what amounts to substantially the same thing, the influence of international trade upon the distribution of national income is a subject which has received an adequate theoretical treatment only in comparatively recent times. The pioneer works in this branch of international economics were, of course, the studies which E. F. Heckscher[4] and B. Ohlin[5] made during the years between the two world wars. It is a curious fact that, just as the classical discussion of the terms of trade had neglected or left unsolved the related problem of the distribution of income, so the more recent contributions to the study of income distribution have neglected the complications arising out of changes in the terms of trade. Indeed, at the very beginning of his article Heckscher asserted that a discussion of the gains from trade has no relevance to the problem of income distribution. "No attention is paid," he said, "to the advantages one particular country may achieve, by means of protection, in altering the relation between supply and demand of a certain commodity and thereby wholly or partly letting the 'foreigner pay the duty'; since this problem has been discussed so widely, and since it is not relevant in the present connection, it seems unnecessary to discuss it here."[6] In the historical development of the theory of international trade, questions of income distribution have thus been rather sharply separated from questions of productivity and of gains or losses to a country as a whole.

In view of this distinct cleavage in the purely theoretical aspects of international trade, it is not surprising that the practical application of economic theory to the particular problem of tariffs has suffered from a similar lack of integration. On the one hand, the concept of reciprocal demand has been employed to demonstrate how tariffs may improve a country's terms of trade—i.e., reduce the prices it pays for its imports relative to the prices it receives for its exports—but little attempt has been made to employ this same concept in showing how the resulting increase of real income is divided among the different factors of production. Indeed, there has at times been a tendency in the classical theory to deny that tariffs exert any influence at all upon the distribution of national income.[7] On the other hand, when a theory of the influence of international trade upon the distribution of income was finally developed, this theory was based in part, as the preceding quotation from Heckscher

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controversy over the Corn Laws, the results of the controversy in this respect were inconclusive and had no permanent influence on the theory of international trade. Cf., however, C. F. Bastable, *The Theory of International Trade* (London: Macmillan & Co., Ltd., 1903), chap. vi.

[4] "Utrikhandelns verkan på inkomstfördelningen" ["The Influence of Foreign Trade on the Distribution of Income"], *Ekonomisk Tidskrift*, (1919), Part II, 1–32. Subsequent references to this paper have been taken from a translation into English prepared by Professor and Mrs. Svend Laursen and to be published shortly in the American Economic Association's "Readings in International Trade and Finance."

[5] *Interregional and International Trade* (Cambridge, Mass., 1933), chap. ii and *passim*.

[6] Heckscher, *op. cit.*, p. 2.

[7] The following statement by Taussig illustrates the point: "The general proposition that a high rate of wages is a result of high productiveness of industry is simple and undeniable. . . . Beyond doubt there remain questions which are more difficult. Just how and through what channel or mechanism does high productivity lead to the high wages? And what determines the share of the total product, be that great or small, which shall go to the laborer, the employer, the owner of capital, the owner of land? But these questions, the most important and perhaps the most complex in the field of economics, *lie quite outside the tariff controversy* . . ."(quoted from *Free Trade, the Tariff, and Reciprocity* [New York, 1920], p. 54). Italics added.

demonstrates, upon the assumption that the influence of tariffs upon the terms of trade can be neglected. But, despite this historical separation of two important aspects of tariff theory, it is easily shown that changes in a country's terms of trade are closely related in a number of ways to changes in the distribution of its national income. It is the purpose of the present paper to show some of the relations between these two distinct and heretofore largely independent branches of tariff theory. Since Heckscher's work is basic to the later studies of tariffs and income distribution, it seems advisable to present a brief summary of his principal conclusions.

Heckscher began his discussion, as did the classical economists, with the assertion that trade between countries depends upon the law of comparative advantage, i.e., upon the fact that the ratio of the cost of production of two commodities is different in one country from the corresponding cost ratio in another. Unlike the classical economists, however, Heckscher placed great emphasis upon the way in which the supplies of various factors of production affect comparative costs. He argued, in particular, that comparative costs in one country differ from those in another primarily because the relative degree of scarcity of some factors of production differs between countries and because different commodities require varying proportions of the factors of production.[8] Suppose, for example, that one country, Alpha, has a large amount of land per worker as compared with another country, Beta. The ratio of rent to wage rates will then be lower in Alpha than in Beta, since land in the former country will be used to the point where its marginal product is relatively small. Consider, now, the comparative costs in the two countries of producing two products, wheat and textiles. Since wheat requires a larger amount of land per worker than textiles do, the money cost of producing a unit of wheat, relative to the cost of producing a unit of textiles, will be lower in Alpha than in Beta. In other words, Alpha will have a comparative advantage in wheat, the product requiring relatively large amounts of its abundant factor, while Beta will have a comparative advantage in textiles.

It is a simple step from these basic propositions concerning comparative advantage to the final conclusions of Heckscher with respect to the distribution of income. Suppose that Alpha and Beta are initially isolated and self-sufficient but that trade is finally opened up between the two countries. Alpha, the low-rent country, will then export wheat and Beta, where rents are comparatively high and wages low, will export textiles. This exchange of goods has a definite and predictable influence upon the demand for land and labor in the two countries. In each country the demand for factors of production is increased in the export industry and reduced in the industry competing with imports; but, as Heckscher pointed out, the proportions in which the factors of production are required in the export industry are not exactly the same as the proportions in which they are released by the industry competing with imports. In the present illustration the expansion of the wheat industry in Alpha requires, at prevailing wages and rents, a small number of workers per acre of land, while the contraction of the textile industry, under the pressure of competition from abroad, releases a relatively large number of workers and only a small amount of land. The shift of resources from textiles to wheat thus increases the

[8] Heckscher, *op. cit.*, p. 6.

relative scarcity of land in Alpha, the country which initially had a comparatively large supply of that factor. Wages per unit of labor accordingly fall in Alpha, relative to rent per unit of land. In other words, the shift in production which was brought about by international trade has given land, the relatively abundant factor in Alpha, a larger share of the total product. An analogous argument could easily be presented—and, indeed, has been presented both by Heckscher and, later, by Ohlin—to show that in Beta, where land is relatively scarce and labor abundant, international trade increases wage rates relative to rents. The central feature of the Heckscher-Ohlin analysis is thus the proposition that international trade, by increasing the demand for each country's abundant factors, tends to equalize the relative returns to the factors of production in different countries.[9]

With this brief introduction, we may now examine the relation of the Heckscher-Ohlin theory to the tariff problem. In view of the tendency of international trade to equalize relative factor returns among different countries, it might seem that the owners of a factor of production which is relatively scarce in a given country would have a strong interest in restricting international trade; for by so doing they could preserve the relative scarcity which might otherwise be threatened by competition from abroad. In a country with an abundant supply of land and a limited supply of labor, for example, the working class might well benefit by tariffs on manufactured goods. Superficially at least, the Heckscher-Ohlin analysis lends support to the pauper-labor argument for tariffs.

Against this view, it may be objected that the conclusions with regard to the influence of trade upon the distribution of national income take account only of the *relative* position of a particular factor of production and make no allowance for the fact that the *absolute* return of the scarce factor may deteriorate even when its relative position improves. Tariffs interfere with the allocation of resources, and, if the real income of an entire nation is thus reduced by protective duties, it may be small compensation to the scarce factor that it now obtains a larger share of the reduced total. Fifty per cent of a

[9] Whether international trade achieves a *complete* or only a *partial* equalization of relative and absolute factor returns in different countries has been a controversial issue. Heckscher, working with a simple model in which the coefficients of production were fixed, argued that the equalization would be complete in both an absolute and a relative sense. Thus, on p. 15 of the article previously cited, he said: "With fixed supplies of the factors of production and the same technique of production in all countries, we have seen that the final effect of international trade, with unimportant reservations, is the equalization of the *relative* prices of the factors of production. We must next inquire whether the equalization will be *absolute* as well as *relative*, *i.e.*, whether rent, wages and interest for the same qualities of the factors of production will amount to the same real return in all countries. This proposition has not thus far been demonstrated, but it is an inescapable consequence of trade." If the coefficients of production were variable, on the other hand, Heckscher believed that substitutions of one factor for another would lead to different techniques of production and hence to differences in relative and absolute factor returns between countries (*ibid.*, p. 16). It was this latter conclusion, rather than the former one, which was subsequently adopted and elaborated by Ohlin and which became more or less the generally accepted view (*op. cit.*, pp. 37–39). Samuelson, however, in a recent study prepared independently of Heckscher's work, has shown that the equalization of relative and absolute returns may be complete even when account is taken of factor substitutions. In other words, Heckscher's first conclusion—i.e., the conclusion that equalization is *complete*—is applicable even to the case of variable coefficients of production (P. A. Samuelson, "International Trade and the Equalization of Factor Prices," *Economic Journal*, LVIII [June, 1948], 163–84). This suggests that the theory of international trade might have been advanced considerably, in the English-speaking world at any rate, by an earlier translation of Heckscher's pioneer article.

national income of 75 is clearly worse than 40 per cent of a national income of 100.[10] But this possibility of a divergence in the movements of *real* and *relative* returns need not detain us further; for Stolper and Samuelson, in a study which forms a sequel to the works of Heckscher and Ohlin, have shown that the real return and the relative return of a particular factor of production are likely to move in the same direction.[11] In other words, if a tariff increases the share of the national income accruing to the working class, it will also improve the workers' standard of living, and conversely. According to the Stolper-Samuelson argument, a country with a comparatively small labor supply could thus increase its real wage rate by means of protection, even though national income as a whole were thereby diminished. To use a common expression, the workers would get not merely a larger share of a smaller pie but a share which was larger, in absolute magnitude, than their previous smaller share of a larger pie. The detrimental effects of the tariff would be shifted entirely upon the country's "abundant" factors of production.

These results follow directly from two assumptions. The first is that a tariff causes factors of production to be shifted from export industries to industries competing with imports. If labor, as before, is taken to be the country's relatively scarce and high-cost factor of production, it follows from the Heckscher-Ohlin conclusions that the export industries will be those requiring a comparatively small amount of labor in relation to other factors, while the industries competing with imports will require a large proportion of labor to other factors. In the absence of changes in factor prices, the shift of resources brought about by a tariff accordingly leads to a scarcity of labor and an excess supply of land and other factors. Wage rates rise relative to rents, and in all industries a substitution of land for labor occurs. This brings us to the second fundamental assumption, namely, that the marginal physical productivity of a given factor in any industry depends exclusively upon the proportion of that factor to the other factors of production. More explicitly, it is assumed that the marginal product of a factor declines as the ratio of that factor to others in a particular industry is increased. Stolper and Samuelson show that, when wages rise relative to rents, the resulting substitution of land for labor causes the ratio of labor to land to decline in all industries. To put the matter another way, the surplus of land and scarcity of labor arising from the shift of resources from exports to industries competing with imports can be eliminated only if there is a reduction, in all industries, in the ratio of labor to land. But if this occurs, then, according to our second assumption, the marginal product of labor must have increased in all industries, compared with the former position of equilibrium. If competitive conditions prevail or if the degree of monopoly is about the same in one industry as in another, it follows that the real wage rate must have increased, regardless of whether this real return is measured in export goods or in the commodities of the industries competing with imports.

Although this conclusion concerning the influence of tariffs upon real wages represented a definite improvement in the theory of tariffs, a number of ques-

[10] Unless conspicuous consumption and social standing are more important than the absolute standard of living.

[11] W. F. Stolper and P. A. Samuelson, "Protection and Real Wages," *Review of Economic Studies*, IX (1941), 58–73.

tions still remained unanswered. Like the earlier works on the subject, the later study by Stolper and Samuelson made no allowance for changes in the terms of trade. The rigid separation between the classical theory of the gains from trade and the modern theory of the distribution of income has thus continued to exist even in the most recent contribution to the subject. This naturally raises the question of whether modifications in the existing theory of tariffs are required if changes in the terms of trade and in the distribution of income are considered simultaneously. The classical theory of the gains from trade demonstrated that, under certain conditions of international demand, a country could increase the external purchasing power of its exports by means of tariffs on imports and that, if this favorable movement in its terms of trade were sufficiently large, the real income of the country imposing the tariff might be increased despite the unfavorable effects of the tariff upon the allocation of resources. Now, since Stolper and Samuelson assumed that a country's external terms of trade were unaffected by a tariff, they were actually considering the least favorable case possible with respect to the real income of the country imposing the duty; the tariff, in the Stolper-Samuelson argument, interfered with the allocation of resources without bringing about any offsetting favorable movement in the terms of trade. Real income of the country as a whole was therefore unambiguously reduced by the import duty.

Let us consider, for a moment, a more favorable case. Suppose that a particular country's exports and imports are important influences on world markets and that a tariff reduces the external prices of imports, relative to the prices of exports, to such an extent that real income for the country as a whole is clearly increased. How does this alter the conclusions summarized above concerning real and relative wage rates? Assuming, as before, that the country has a scarcity of labor and therefore imports commodities requiring a large amount of labor, it might appear at first glance that the tariff would increase real wages, perhaps to a considerable extent; for, if the real as well as the relative returns of labor are increased by a tariff even when the duty reduces real income of the country as a whole (the Stolper-Samuelson case), it might seem that the rise in real wages would be even greater if real income as a whole were increased. To return to our previous analogy, it would surely seem better for labor to receive a larger share of an increasing pie than to receive a larger share of a diminishing pie. Although this argument seems plausible, it is actually misleading, for the improvement in terms of trade affects not only real income as a whole but also the degree of scarcity of the so-called "scarce" factors. Paradoxical as it may seem, when changes in the terms of trade are taken into consideration, tariffs or other impediments to imports do not always preserve or increase the scarcity of the scarce factors of production. Under some conditions of international demand the industries competing with imports and the scarce factors of production, which are usually required in large amounts in such industries, may benefit from free trade and suffer from protection.

The precise conditions of international demand required to bring about such an unexpected result are described in Section II. The argument is presented by means of the familiar Mill-Marshall schedules of reciprocal demand.[12]

[12] The reader will recognize that in adopting this method I have not added anything essentially new

II

Whether a tariff injures or benefits a country's scarce factors of production depends largely upon how it affects the output of exports and of commodities competing with imports. If output expands in the industries competing with imports and contracts in the export industries, the increased demand for scarce factors of production in the expanding industries will normally exceed the supplies made available in the contracting export industries; and, as Stolper and Samuelson have shown, the real returns as well as the relative shares of the scarce factors in the national income will thus be increased. In a large part of the nontechnical literature dealing with tariffs, and even in some of the technical literature, a shift of this sort is normally taken for granted; indeed, it is frequently regarded almost as a truism that tariffs injure export industries and benefit industries competing with imports. Nevertheless, when both primary and secondary price changes are taken into consideration, this is by no means a self-evident proposition. To be sure, the tariff itself is the cause of a direct increase in the domestic prices of imports over and above world prices, and this constitutes an immediate benefit to the industries competing with imports. But, on the other hand, the tariff is also the cause of a series of events which tend to reduce the world prices of the country's imports relative to the prices of its exports—i.e., to improve the terms of trade—and this secondary reduction of world prices of imports relative to exports may more than offset the initial primary increase.

Now it is reasonable to suppose that resources will not be permanently shifted from the export industries to the industries competing with imports unless the net effect of all primary and secondary price changes is an increase in the domestic prices of imports (including tariffs) relative to the domestic prices of exports. Whether a tariff increases or reduces the real and relative returns of the scarce factors, therefore, depends upon the magnitude of the favorable movement in the terms of trade, compared with the size of the tariff. If the former is greater than the latter, the final effect of the tariff will be a reduction of the domestic prices of imports relative to the prices of exports, and resources will accordingly be shifted from industries competing with imports to the export industries. In other words, the industries producing commodities for export will expand, after tariffs are imposed, while industries competing with imports will contract, an outcome diametrically opposite to the usual expectation. Suppose, for example, that the ratio of the world prices of a country's imports to the world prices of its exports is initially taken to be 1:1. Suppose, now, that a tariff of 50 per cent ad valorem is placed upon all imports and that, as a result of the ensuing reduced demand for imports, the ratio, in world prices exclusive of tariffs, of import prices to export prices falls to 1:2. The domestic price ratio, which differs from the world price ratio by the amount of the tariff, will then be 1.5:2, compared with 1:1 before the tariff was imposed. The tariff has thus reduced the domestic prices of imports relative to the prices of exports, and a transfer of resources from the "protected" industries to the export indus-

to the well-known classical technique. My purpose, rather, is to apply this technique to a problem which was seldom discussed and never strongly emphasized in the classical literature. In doing this, I have made particular use of the classical theory in the form in which it was expounded by A. P. Lerner ("The Symmetry between Import and Export Taxes," *Economica*, III [new ser., 1936], 308–13).

tries may accordingly be anticipated. Under these circumstances the effects of the tariff upon the distribution of income are exactly opposite to the conclusions reached by Stolper and Samuelson; the scarce factor of production, i.e., the factor relatively most important in the industries competing with imports, suffers both a relative decline in its share of the national income and an absolute decline in its real return. The most important factor of production in the export industries, on the other hand, enjoys both a relative and an absolute increase of income.

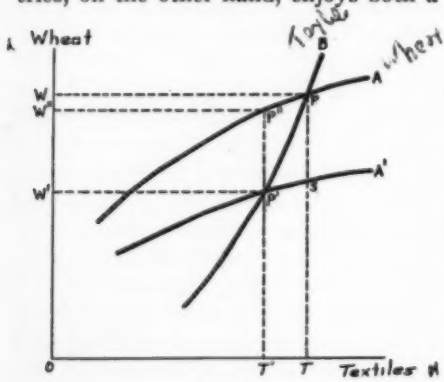

FIG. 1

The magnitude of the favorable movement of the terms of trade which occurs when tariffs are imposed obviously depends upon conditions of international demand in a way that has been familiar to all economists at least since the time of Mill. It is therefore appropriate to state the argument in terms of the Mill-Marshall equations of reciprocal demand. As before, I shall assume that there are two countries—Alpha and Beta—producing two commodities—wheat and textiles—and that, for the reasons discussed above, Alpha has a comparative advantage in the production of wheat, while Beta has an advantage in textiles. In Figure 1, the curves A and B represent the reciprocal demand schedules of the two countries, Alpha and Beta, for imported textiles and wheat, respectively, under conditions of free trade.[13] Equilibrium is established at the point P, which implies that Alpha imports an amount OT of textiles in exchange for OW of wheat. Suppose, now, that Alpha imposes an ad valorem duty of 50 per cent upon imported textiles. If we neglect for a moment the effects of the spending of the proceeds of the tariff by the government of Alpha, it is clear that the initial effect of the tariff is to reduce the demand schedule facing the exporters of textiles in Beta from A to A'. In other words, textile importers in Alpha will now be willing to give to the exporters in Beta only TS units of wheat for OT of textiles; a money value equal to the additional amount, SP, which citizens of Alpha formerly gave to Beta, now goes to the Alpha government as a duty. This means that SP is 50 per cent of TS or that TS is two-thirds of TP, and similarly for any other point, such as P', on the new demand schedule.

After the tariff has been imposed, the new equilibrium in terms of quantities actually traded is at P', at which point OW' units of wheat are exported by Alpha and OT' units of textiles are imported. Unless B is a straight line from the origin, which implies that the demand in Beta for the exports of Alpha is infinitely elastic, it is obvious from Figure 1 that the tariff will improve the

[13] In all the figures the reciprocal demand schedules are assumed to depend not only upon conditions of demand but also upon conditions of production. The elasticity of a given reciprocal demand schedule is thus a combined result of substitutions on the part of consumers and shifts of resources on the part of producers (see W. W. Leontief, "The Use of Indifference Curves in the Analysis of Foreign Trade," *Quarterly Journal of Economics*, XLVII [1933], 493–503).

terms of trade of Alpha. The fraction OT'/OW' is clearly larger than OT/OW, which means that Alpha obtains more units of textiles for a given amount of wheat than was true under free trade. Or, to put the matter another way, the world price of textiles, exclusive of the tariff, has fallen, relative to the world price of wheat. The bargaining position of Alpha, the country imposing the tariff, is thus improved. Such an improvement in Alpha's terms of trade is, of course, completely explained by the classical theory of international trade and would not need to be considered further except for its influence upon the distribution of income. In order to see how the tariff has affected the distribution of income in Alpha, we must look at domestic prices rather than at world prices. This means that the tariff must be added to the world price of textiles. Measured in terms of their export commodity, the total outlay of the residents of Alpha for imported textiles, including their outlay for the tariff, is not OW', in Figure 1, but OW'', an amount 50 per cent greater than OW'. In other words, in terms of value actually expended, the residents of Alpha are giving up the equivalent of OW'' units of wheat for OT' units of textiles; the domestic ratio of exchange is therefore given by the fraction OT'/OW''. Now, since OT'/OW'' is less than OT/OW in Figure 1, it is obvious that, with the schedules of reciprocal demand there assumed, the tariff has caused the domestic price of textiles in Alpha to rise, relative to the price of wheat; land and labor are therefore shifted from wheat to textile production; and the relative share of labor in the national income, as well as the real wage rate, is increased.

It is easily shown that this conclusion is valid for reciprocal demand schedules other than those depicted in Figure 1, as long as the demand of Beta for the products of Alpha is elastic. The foregoing argument may therefore be generalized as follows: If the world demand for a country's exports is elastic and if we neglect the effects of government expenditures on the demand for imports, (1) a tariff always increases the domestic prices of imports relative to the prices of exports; (2) the improvement in the terms of trade is not sufficient, in this case, to offset the tariff itself; (3) the protected industries become more profitable, relative to the export industries; (4) resources are shifted from the latter to the former; and (5) the real returns to the country's scarce factors of production, as well as these factors' share in the national income, are increased. The Stolper-Samuelson conclusion is thus valid, even when changes in the terms of trade are taken into account, as long as the demand for exports is elastic.

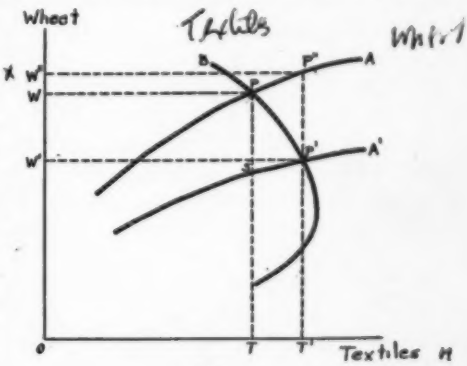

FIG. 2

When the demand for exports is inelastic, the conclusions of the last paragraph must be reversed. This situation is depicted in Figure 2, where the demand of Beta for the product of Alpha is assumed to be inelastic at the equilibrium point, P. In other words, in the neighborhood of P the residents of Beta are will-

ing to give up decreasing amounts of textiles in exchange for an increasing amount of wheat. The notation is the same as in Figure 1. The original equilibrium is at P; but, after the tariff is imposed, the point of balanced trade moves to P', at which point Alpha gives up OW' units of wheat in exchange for OT' units of textiles. As before, the terms of trade move in favor of Alpha. Indeed, in the present example a greater amount of textiles is obtained for a smaller amount of wheat, and the favorable movement in the terms of trade of Alpha is now so great that the domestic price of textiles, including the tariff, is lower, relative to the price of wheat, than it was before the tariff was imposed. This is shown in Figure 2 by the fact that OT'/OW'' is greater than OT/OW.

When the demand for a country's exports is inelastic, the foregoing argument shows that a tariff, far from protecting the industries competing with imports, may actually make these industries worse off than under free trade. In Figure 2, for example, the tariff on textile imports into Alpha reduces the domestic price of textiles, relative to the price of wheat, and leads to a shift of resources in Alpha from the textile industry to the wheat industry. This result is, of course, well known from the classical and neoclassical theories of international trade; but, so far as I am aware, its implications for the distribution of income have never been fully discussed. Figure 2 implies that, when the demand for a country's exports is inelastic, the scarce factors of production—those required in comparatively large amounts in the import industries—actually suffer both a relative and an absolute decline in income when tariffs are increased. Although it seems paradoxical, the scarce factors of production and the industries competing with imports, under the conditions of Figure 2, actually achieve economic gains from free trade and suffer losses from protection. In other words, if labor is the scarce factor of production and the standard of living is therefore high, a country is not likely to be able, by means of tariffs, to protect its workers from the competition of "cheap foreign labor" unless the demand for its exports is elastic. Some of the implications of this conclusion for producers of primary products who are attempting to industrialize by means of tariffs are discussed in Section III.

Nothing has been said, as yet, about how the government which imposes import duties disposes of the resultant revenue. In this respect the preceding discussion of Figures 1 and 2 is deficient, for the manner in which the government revenues are spent will obviously influence the reciprocal demand schedule of the country introducing the tariffs. If the customs revenues are used in part to purchase imported goods, for example, the reciprocal demand schedule of Alpha will not fall from A to A' but will lie somewhere between these two curves. In the classical discussion of this question two limiting examples were usually considered: the customs revenues were assumed to be spent either entirely upon the export goods of the taxing country or entirely upon imports.[14] The reader will no doubt have recognized that Figures 1 and 2 belong to the first of these alternatives. No part of the tariff proceeds, in these two illustrations, is spent on imported goods; for, if it were, the reciprocal demand schedule would not fall, as assumed in the figures, by the full amount of the tariff. Moreover, it is easy to see

[14] See, e.g., A. Marshall, *Money, Credit, and Commerce* (London, Macmillan & Co., Ltd., 1929), pp. 344–48.

that both diagrams implicitly assume the full proceeds of the tariffs to be spent on goods formerly exported from Alpha. Thus at the new equilibrium point, P', Alpha exports OW' of wheat to T. The equilibrium point, P', however, is stated in world prices, and this equilibrium corresponds to a domestic ratio of exchange in Alpha, including tariffs, of OT' units of textiles for OW'' units of wheat. In other words, at the new domestic price ratio, exporters in Alpha offer OW'' units of wheat, an amount which exceeds the purchases of wheat in Beta by $W'W''$. The supply of wheat is thus not equal to the demand unless this excess supply is purchased by the government of Alpha. But the excess supply of wheat, $W'W''$, is simply the amount of duties collected by the government of Alpha, measured in the export product of that country. Figures 1 and 2 are thus implicitly based upon the assumption that the tariff-imposing country uses the entire proceeds of the tariff to purchase goods from its own exporters.

Such an assumption is clearly unrealistic. It would be more reasonable to suppose that the purchasing power acquired through customs duties is divided in some manner between the purchase of domestic goods and the purchase of imports. Before considering this intermediate case, however, it may be useful, following the Marshallian tradition, to go from the one extreme, at which customs revenues are used entirely in the purchase of the tariff-imposing country's export product, to the other extreme, at which the customs revenues are devoted entirely to the purchase of imports. This second extreme case is represented by Figure 3. As in the earlier diagrams, equilibrium is initially at P, with Alpha giving up OW units of wheat in exchange for OT units of textiles. A tariff of 50 per cent is imposed upon textile imports into Alpha, but, unlike the earlier examples, the government collecting the duties is now assumed to spend the entire proceeds upon imported textiles. The additional demand for imports by the government accordingly prevents the demand schedule of Alpha for the products of Beta from falling as far as it otherwise would have fallen. In Figure 3 the new demand schedule, including government demand for imports, is given by the line A'', whereas the private demand alone has fallen, as before, to the line A'.

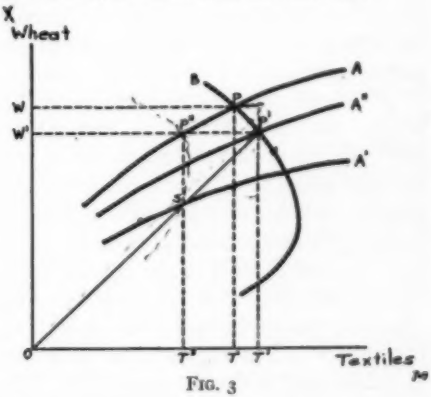

FIG. 3

The relations between the three demand schedules—A, A', and A''—may be illustrated by considering the point P'' on the old schedule, A. This point indicates that, before the tariff was imposed, the traders in Alpha would have been willing to give up OW' units of wheat for OT'' units of textiles. When the new tariff becomes effective, the private traders' demand schedule drops, as before, from A to A'. The vertical distance between A and A' thus indicates the amount of the tariff, measured in wheat, corresponding to any given level of textile imports. In Figure 3, for example, the distance SP'' is 50 per cent of $T''S$. Suppose, for purposes of illustration, that the

world rate of exchange between wheat and textiles, exclusive of any tariffs, were given by the slope of the line OSP' drawn through the origin of Figure 3. Consumers and traders in Alpha would then purchase OT'' units of textiles, for which they would pay $T''S$ units of wheat to B and an additional SP'' units of wheat to their own customs officials. But the government of Alpha is assumed, in the present example, to spend the entire tariff revenues on imported commodities, and this means that the amount SP'' must be exchanged for textiles at the world price ratio. At this given ratio, the government collecting the duties would accordingly acquire an amount of textiles equal to $P''P'$ in exchange for customs revenues which, measured in wheat, amount to SP''. The final effect of the tariff on the demand schedule of Alpha, including the government demand for imports as well as the private demand, is thus found to be a horizontal shift in the entire schedule, the relative extent of the shift being exactly equal to the rate of the tariff. The distance $P''P'$, in Figure 3, for example, is 50 per cent of the distance $W'P''$. The new demand schedule, A'', might have been derived by more direct methods, but the preceding argument, I believe, shows more clearly than most others why A'' must lie between A and A'.[13]

With these preliminary remarks we may now return to the effects of the tariff on prices at home and abroad. As in the earlier examples, the tariff improves the terms of trade of the country imposing it, which means that the price of Alpha's imports, exclusive of the tariff, declines relative to the price of that country's exports. This is shown in Figure 3 by the fact that Alpha now imports a larger amount of textiles (OT') in exchange for a smaller amount of wheat (OW'). These terms of trade, however, are measured in foreign prices, and, as before, it is the domestic price ratio rather than the foreign price ratio which governs the distribution of income in the taxing country. The domestic price of textiles in Alpha is higher than the foreign price by exactly the amount of the tariff; and, when this is taken into account, it is clear from Figure 3 that the final effect of the tariff, including both primary and secondary effects, is to raise the domestic price of textiles relative to the price of wheat. In other words, under the conditions assumed in Figure 3, the direct influence of the tariff in raising the price of textiles in Alpha is more important than is its indirect influence in improving that country's terms of trade. As far as private traders and consumers are concerned, the domestic rate of exchange is given, as in the earlier examples, by the point P''. The private traders obtain OT'' units of textiles in exchange for OW' units of wheat. The remaining $T''T'$ units of textiles are, in effect, paid to the government of Alpha as customs duties. Now, since the demand schedule A'' was derived from the schedule A by a horizontal shift, it is apparent from the diagram that the point P'' on the old schedule must lie to the left of the original equilibrium point P. And, as in Figure 1, unless the demand schedule of Alpha has an infinite elasticity, the point P'' represents for that country a higher domestic price of textiles relative to the price of wheat than does the point P.

When the proceeds of a tariff are spent entirely on imports, as in Figure 3, it is evident that the domestic price of imports rises, in the country imposing the tariff, relative to the domestic price of

[13] If the demand of Alpha for the product of Beta is inelastic, A' will actually lie *above* the curve A; i.e., under these circumstances a tariff will *increase* the demand of Alpha for the products of Beta.

exports, even though the foreign demand for the exported commodity is inelastic. The tariff accordingly leads, as in the earlier example depicted by Figure 1, to a shift of resources from the export industry, wheat, to textiles, the industry competing with imports. Both the real income and the relative share in the national income of the scarce factor, labor, are thereby increased in the manner envisaged by Stolper and Samuelson. In other words, when customs duties are employed entirely in the purchase of imports, no modifications are required in the Stolper-Samuelson conclusion that tariffs benefit the factors of production which are required in relatively large amounts in the industries competing with imports. And this is true regardless of the size of the elasticity of demand for a country's exports. If the foreign demand is extremely inelastic, the improvement in terms of trade will, of course, prevent import prices in the high-tariff country from rising by a large amount and will thereby mitigate to some extent the influence of the tariff on the distribution of income. But in any event the direction, if not the size, of the change in income distribution will be substantially as envisaged in the earlier work on the subject.

We have now illustrated the effects of a tariff with two extreme examples. In the first, the customs duties were assumed to be spent entirely upon the export goods of the taxing country, while in the second the duties were spent entirely in the purchase of imports. It remains only to consider the intermediate and more realistic case in which expenditure of the tariff revenues is divided in some manner between export goods and imports. Before presenting a geometric illustration of this intermediate case, however, a few general statements are needed concerning the relations between tax revenues and governmental expenditures.

The fiscal systems of most modern states are so complex that it is virtually impossible to associate any particular expenditure with a given type of revenue. What sense does it make, under such conditions, to assert that the proceeds of a tariff are spent in a certain manner on home goods and imports? How can any particular expenditure or group of expenditures be identified as a direct consequence of tariff revenues? Some economists have gone so far as to say that the problem is an impossible one and that the circular flow of income through the government accounts cannot be traced in such an exact manner. Although there is considerable substance to this argument, it seems to me that the conclusion to which it leads is nevertheless unduly pessimistic. Even without attempting to find a direct link between every individual expenditure and every item of revenue, it may yet be possible to say that expenditures as a whole, including private expenditures as well as public, have been affected in a certain way by an increase or a decrease of tariffs. For most purposes, including the present one, it is probably best to regard government expenditures as fixed and largely independent of the particular type of taxation employed to collect revenues. If the over-all budgetary deficit or surplus is likewise the result of an independent decision, tariffs can then be envisaged as replacing or supplementing other forms of taxation. In other words, an increase in government revenues from customs duties can be associated directly with a decrease in some other form of taxation or can be considered as making unnecessary an increase in some other form of taxation. When viewed in this way, the problem of

tracing the effects of tariffs on the circular flow of income is largely shifted from the governmental to the private sphere of the economy. The question now is not how the tariff affects *government* expenditures on export and import goods but how the change in taxation affects *private* expenditures. The increase in customs revenues means that other forms of taxation, such as income taxes, for example, can be correspondingly reduced; and the added income thereby made available to the private sector of the economy will normally be spent in a cer-

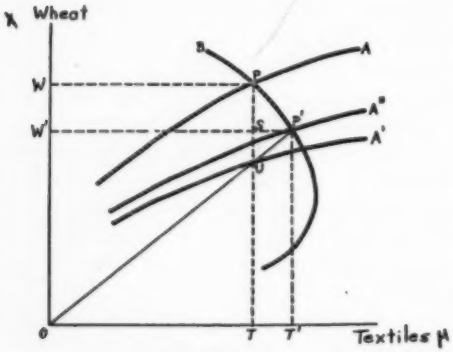

FIG. 4

tain way on imports and domestic goods. Suppose, for example, that income-earners, on the average, spend about 20 per cent of their incomes on imported goods, including raw materials and semifinished goods as well as finished goods. A reduction of income taxes, made possible by increased customs duties, will then lead to an increase in expenditures on imports equal to roughly two-tenths of the customs duties. Although there is no immediate connection between the customs revenues themselves and the added expenditures on imports, we can nevertheless say that the latter were indirectly the result of the former. More generally, if the marginal propensity to import of the private sector of the economy is k, we can carry out our examination of the effects of the tariff *as though* a fraction k of all customs revenue was actually spent on imported goods; the remaining part of the remitted taxes, or a fraction $1 - k$ of customs duties, can then be regarded as spent, directly or indirectly, on the purchase of export goods.[16] The size of k will, of course, vary with the nature of the taxation system, but this is a refinement which cannot be discussed here.

With these ideas in mind, consider, now, the situation in Figure 4. As in the earlier diagrams, foreign trade is initially in equilibrium at the point P, with Alpha exporting OW units of wheat and importing OT units of textiles; and once again this equilibrium is disturbed by a 50 per cent tariff on textile imports. Unlike the previous illustration, however, the proceeds of the tariff are now assumed to be divided in the proportions k and $1 - k$ between the purchase of imports and exports, respectively. It makes no fundamental difference in the geometric argument whether these proportions are determined directly by government purchases or indirectly through the reduction of other taxes.[17] Figure 4 has been

[16] The argument at this point is distinctly classical in that added income is assumed to be entirely spent, directly or indirectly, in the purchase either of home goods or of imports. There is, of course, no logical reason why a propensity to save could not be introduced along with the two propensities to spend; but this would raise a number of vexatious questions concerning the effects of tariffs upon employment which could not possibly be given adequate treatment within the limits of the present study.

[17] This statement is an approximation which is strictly accurate only when the size of the tariff is small. If the tariff is substantial, the shift in demand will not be the same when the government spends the customs revenues as when they are spent by private traders. The difference is attributable to the fact that private traders pay duties on their added purchases from abroad, whereas the government does not. But this is a matter of detail which does not affect the substance of the argument, and it may accordingly be left over to a later paper.

drawn with such values for k, the marginal propensity of Alpha to import, and η, the price elasticity of demand for Alpha's exports that the favorable movement in that country's terms of trade exactly offsets the direct effect of the tariff itself, leaving the domestic price ratio of the two commodities unchanged. But, before discussing the relation between the marginal propensity to import and the price elasticity which is necessary to bring about this result, a word should be said about the three reciprocal demand schedules A, A' and A''. The line A', as in Figure 3, represents the private demand for imports after the tariff is imposed, without making any allowance for the expenditure, direct or indirect, of the customs revenues. Thus the distance UP is 50 per cent of TU, etc. Now consider a world rate of exchange of the two commodities, exclusive of the tariff, represented by the slope of the diagonal OP'. Neglecting the effects of spending the duties, private traders and consumers in Alpha, at this rate of exchange, would import OT of textiles and would export TU of wheat. The tariff received by the government, expressed in the exports of the taxing country, would then be UP. This amount would be returned to the residents of Alpha in the form of reduced taxes, and part of the income so received would be used to augment the demand for imports. In the diagram the assumption is made that a proportion equal to US/UP of this added income is spent on imports; in other words, $k = US/UP$. At the given foreign price ratio, importers in Alpha would thus obtain an additional amount of textiles equal to SP', or TT', which means that expenditure of the tariff revenues would have the effect of shifting the point U on the line A' over to the point P' on line A''.[18] A similar construction could be developed for any other point on A'.

After the tariff becomes effective, the new demand schedule of Alpha facing the exporters of Beta, including indirect as well as direct effects on the tariff, is, of course, the line A''. The demand schedule of Beta for the products of Alpha has not been altered, and the point of equilibrium between the two countries, in terms of quantities actually imported and exported, accordingly shifts from P to P' in Figure 4. Where Alpha formerly exported OW units of wheat and imported OT of textiles, she now exports a smaller quantity of wheat (OW') in exchange for a larger quantity of textiles (OT'). The gain to the taxing country, regarded as a unit, is obvious; the foreign price of textiles has fallen, relative to the foreign price of wheat, and this favorable movement in Alpha's terms of trade is so great that the country obtains more textiles than before in exchange for a smaller amount of wheat. And yet, if we look at the domestic price ratio in Alpha, including the tariff, we find that this ratio is exactly the same as before the tariff became effective. To put the matter another way, the direct effect of the customs duty in raising the price of textiles in Alpha, relative to the price of wheat, is exactly offset by its indirect effect through the change in world prices. The new foreign price ratio—i.e., the ratio exclusive of the tariff—is shown in Figure 4 by the line OP'. The domestic price ratio in Alpha, which differs from the foreign ratio only by the tariff, will therefore be given by the slope of a line through the origin (not shown in the diagram) whose vertical distance from the OT

[18] This statement again ignores the fact that the private traders pay duties on their added imports as well as on their original imports. If the tariff is small, however, these "duties on duties" will be insignificant compared with the duties on total imports.

axis is 50 per cent above the vertical distance of a corresponding point on OP'. Since OP' cuts the schedule, A', at U, a point which is directly below P, and since the original shedule A is 50 per cent above A', it follows that the new domestic price ratio in Alpha is represented by the original equilibrium point, P. In other words, the relative prices actually paid and received by consumers and producers of the two goods in Alpha are unaltered by the tariff.

Under these circumstances it may, at first, seem paradoxical that the country imposing the tariff should alter the physical quantity of its exports and imports at all. Relative domestic prices remaining unchanged, producers of both textiles and wheat in Alpha presumably continue to produce the same quantities of the two commodities as before. No shift in resources between the two industries takes place, and the distribution of income earned in production is therefore the same as before the tariff was imposed. How does it happen, then, that Alpha exports a smaller amount of wheat than in the original equilibrium and imports a larger amount of textiles? The answer to this question is to be found in the effects of the customs duties upon the circular flow of income. Since the revenues received from the tariff enable the government of Alpha to reduce other taxes without disturbing its expenditures upon goods and services, income available to the factors of production increases, even though total output remains unchanged. And, according to our original assumption, a fraction k of this increased income is devoted to imports, while $1 - k$ is spent on goods produced by the export trades. Thus both the rise in imports (TT') and the fall in exports ($W'W$) are indirect consequences of added purchases in Alpha from the proceeds of the customs duties themselves. Indirectly, the customs proceeds are used both to purchase goods which would otherwise have been available for export and to increase the volume of imports. Here is perhaps the clearest case imaginable in which, to use a familiar expression from innumerable tariff controversies, "the foreigner pays the tax."

In Figure 4 the reciprocal demand schedules of both countries and the marginal propensity of Alpha to import have been drawn in such a way that a tariff on imports leaves all domestic price ratios in the taxing country unaltered. We must now see whether this result can be generalized. In other words, instead of considering a given tariff rate of 50 per cent, we shall consider a general rate, τ, and, instead of assuming a particular set of reciprocal demand schedules and a given marginal propensity to import, we shall assume a general set of demand schedules and a general propensity to import. We may then inquire what relations must exist between all these functions in order that a tariff shall leave the taxing country's domestic price ratios unchanged. It turns out that the answer to this question depends upon only two functions, the price elasticity of demand for imports abroad, i.e., the price elasticity in Beta, and the marginal propensity of the taxing country, Alpha, to import. The symbol, η, will be used to indicate the elasticity of demand for imports in Beta, while k, as before, will be used to indicate the marginal propensity of Alpha to import. The precise relation between η and k which is required to bring about the situation depicted in Figure 4 was first derived more than a decade ago by Lerner; but, since Lerner's work was presented in a somewhat different con-

text, it seems desirable to give a slightly modified version here.[19]

If relative prices in the taxing country are unaffected by the tariff, this means, as noted before, that the primary influence of the duty in raising the domestic price of imports in Alpha is exactly offset by its secondary influence upon world prices or upon the terms of trade. Suppose that this is actually true. In other words, suppose that the decline in the world price of textiles, relative to the world price of wheat, is just sufficient to offset the tariff in Alpha. We now wish to know what conditions of demand and supply must prevail in order that this new world price ratio shall be an equilibrium ratio. In view of the fact that the reciprocal demand schedules represent both a demand for one commodity and a supply of another, it will be sufficient to consider either the supply and demand for textiles or the supply and demand for wheat. Equilibrium in the one market implies equilibrium in the other, and it is therefore unnecessary to consider both. As a practical matter it is perhaps easiest to consider the supply and demand for textiles.

Since the domestic price ratio in Alpha remains unchanged, that country's demand for textile imports is influenced only by the expenditure of the tariff proceeds. With a tariff rate of τ, customs duties as a percentage of the value of private imports will likewise be τ. By assumption, a proportion, k, of these duties is spent on imports. The relative increase in the demand for imports in Alpha will therefore be $k\tau$. The question now is whether and under what circumstances this increased demand in Alpha will be matched by an equivalent increase in supply from Beta. The demand in Beta for the exports of Alpha is assumed to be inelastic; and, when the world price of textiles declines, as it does when the tariff is imposed, Beta therefore offers an increased amount of textiles in exchange for a reduced quantity of wheat. Using the notation of Figure 4, the relative increase in the supply of textile exports from Beta is TT'/OT. This, in turn, is approximately equal to $-\beta(W'W/OW)$, where β is the elasticity of the reciprocal demand schedule, B. But $W'W/OW$ represents the additional wheat consumption in Alpha, relative to the previous level of exports, and this additional expenditure arises entirely from the proceeds of the tariff. An amount $k\tau$ was spent on imports, and the remainder, or $(1-k)\tau$, is accordingly spent on wheat formerly exported. The quantity $W'W/OW$ is thus equal to $(1-k)\tau$, and the additional supply of textile exports from Beta may be expressed thus: $-\beta(1-k)\tau$. If this additional supply is to equal the additional demand, we must have[20]

$$k\tau = -(1-k)\tau\beta\,, \qquad (1)$$

or, dividing both sides by τ,

$$k = -(1-k)\beta\,. \qquad (2)$$

This is one way of expressing the condition that must be met if a tariff is to leave the taxing country's internal prices unaltered. The term β, however, represents the elasticity of the reciprocal demand schedule B, and it is frequently more useful to express the results, as Lerner has done, in terms of the elasticity of the ordinary money demand schedule. If η represents this latter elasticity, it is well known that, subject to certain sup-

[19] Lerner, *op. cit.*, pp. 310–11.

[20] The expression $(1-k)\tau\beta$ is positive because, with an inelastic demand for imports in Beta, β is negative.

ply limitations, $\beta = 1 - 1/\eta$.[21] Substituting this value of β in equation (2), we have

$$k = -(1-k)\left(1-\frac{1}{\eta}\right), \qquad (3)$$

and, after simplifying, this becomes

$$\eta = 1 - k\,. \qquad (4)$$

In words, this says that, if a tariff is to leave domestic price ratios and the distribution of income within the taxing country unaltered, the foreign elasticity of demand for that country's exports must be equal to the difference between unity and the marginal propensity to import of the country imposing the tariff. If a country has a marginal propensity to import of 0.25, for example, a tariff imposed by that country will not leave domestic price ratios unchanged unless the foreign elasticity of demand for its exports is 0.75. If the foreign elasticity is smaller than this, the tariff will cause the domestic prices of imports to fall relative to the domestic prices of exports. On the other hand, if the foreign elasticity is larger than 0.75, the tariff will increase domestic import prices relative to export prices.

The practical consequences of these results will be discussed in Section III; but before proceeding further it seems desirable to summarize the main argument of the present section. The conclusions are intimately related to the proposition developed by Stolper and Samuelson that any event, other than a change in technology, which leads to a shift in resources from one industry to another will increase both the real income and the relative share in total income of the factor required in relatively large amounts in the expanding industry. A corollary of this, of course, is the proposition that the factor of production required in relatively large amounts in the contracting industry will find both its real return and its relative share of the total income reduced. The problem of how a tariff influences the distribution of income is, therefore, largely resolved into a discussion of the effects of the tariff in shifting resources from one industry to another. The shift in resources, in turn, depends upon how the tariff affects domestic prices; for it may be taken for granted that, if resources shift at all, they will move into industries the products of which have enjoyed relative price increases. The present section has therefore been devoted largely to a discussion of the influence of customs duties on domestic prices of both exports and imports.

We have found that a tariff has two effects, which influence relative domestic prices in opposite directions. On the one hand, the tariff itself represents a direct increase in import prices, and, on the other hand, the resulting reduction in the demand for imports depresses the foreign prices of these goods relative to corresponding prices for export goods. The net effect upon relative prices at home thus depends upon which of these forces is the stronger. By following a technique originally expounded by Lerner, we have shown that a tariff will not increase the relative domestic price of imports unless η, the foreign elasticity of demand for the country's exports, is greater than $1 - k$, where k is the marginal propensity to import.

[21] Let t equal the quantity of textiles that Beta is willing to export, and let w represent that country's demand for imported wheat. The elasticity, β, of the reciprocal demand schedule is then $dt/dw \cdot w/t$. But the quantity t, from one point of view, is simply the total outlay of Beta for imports, w. In money terms, in other words, $t = pw$, where p is the import price of wheat. β may therefore be written $\beta = d(pw)/dw \cdot w/pw$. Upon simplifying and carrying out the indicated differentiation, this becomes $\beta = 1 + dp/dw\ (w/p) = 1 - 1/\eta$, the elasticity, η, being defined now in the Marshallian sense.

Although the final conclusions with respect to prices have been presented in four diagrams, the first three are really special cases of the fourth. In Figures 1 and 2, the proceeds of the tariff were assumed to be spent entirely on export goods, and the marginal propensity to import was thus implicitly set at zero. Since the expression $1 - k$ then had a value of unity, it was found that the tariff would not increase the relative domestic price of imports unless the foreign elasticity of demand for the country's exports was greater than unity. In Figure 3, on the other hand, the proceeds of the tariff were assumed to be spent entirely upon imports, and this was equivalent to assuming a marginal propensity to import of unity. The value of $1 - k$ for the special case represented by Figure 3 was thus zero; and we found that a tariff always increased the relative domestic price of imports, no matter how small the foreign elasticity of demand for the country's exports. Now, since $1 - k$ is in all circumstances less than unity, it is clear that, if the foreign demand for a country's exports is elastic with respect to prices, a tariff will always increase domestic import prices relative to export prices. In all such cases the shift of resources will be toward industries competing with imports and away from the export industries. The factors of production used in relatively large amount in the protected industries will consequently gain, both absolutely and relatively, while the factors used in large amounts in the export trades will lose. All this is completely in accord with the Heckscher-Ohlin conclusions as well as with the work of Stopler and Samuelson. It is only when the foreign demand for a country's exports is inelastic that the earlier works on the subject require modification. When the foreign demand is sufficiently inelastic, a tariff, far from protecting industries competing with imports at the expense of the export trades, may actually benefit the latter at the expense of the former. If this happens, resources tend to be shifted from the "protected" industries to the export industries, and the factors of production which are used in relatively large amounts in the export industries enjoy both a relative and an absolute increase in real income.

III

The aspect of tariff theory which the preceding discussion outlines most sharply is the potential or actual conflict of interests that may arise between a country's relatively scarce factors of production and the remainder of the economy. The classical dictum that real wages and the returns to other factors of production depend upon productivity remains true in a general way, of course; but the preceding argument shows that this dictum cannot be applied to the particular problem of tariffs without numerous reservations and exceptions. It cannot be asserted, for instance, that tariffs necessarily reduce productivity and thereby lower the real incomes of all factors of production. In the first place—and this is an argument of which the classical economists were fully aware—tariffs, under favorable circumstances, may improve a country's terms of trade so much that real income for the country as a whole is thereby increased. But this is a familiar argument to which the present paper has made no particular contribution. The point to be emphasized is a second reservation, namely, that the returns to each of the factors of production do not necessarily move in the same direction as general productivity or real income of the economy as a whole. In other words, regardless of whether a high-tariff policy

increases or diminishes real income for a country as a whole, such a policy is likely to affect some factors of production favorably and others adversely. This point of view, in fact, might be stated even more strongly: the real income of a country's scarce factors of production is not likely to be increased by a tariff unless world demand is such that the tariff clearly diminishes the country's total income; and, conversely, the scarce factors are not likely to be injured by a tariff unless the tariff benefits the rest of the economy.

To clarify these propositions, consider a country having a comparative scarcity of labor and importing commodities with a high labor content. Stolper and Samuelson have shown that, *if the terms of trade are not affected*, a tariff in such a country will probably increase both the real wage rate and the proportion of the national income accruing to the working class. Now, if the terms of trade remain unchanged, this means that the tariff, while disrupting the allocation of resources and thereby tending to reduce real income for the country as a whole, has not succeeded in bringing to the economy the benefits of a more favorable bargaining position in world markets. In other words, when the terms of trade remain unaltered, a tariff causes an unambiguous reduction in a country's real income as a whole. But this is precisely the condition, according to the Stolper-Samuelson argument, when a tariff increases the absolute and relative return to labor, the country's scarce factor of production. If I may return to an earlier metaphor, the scarce factor of production receives a larger piece of a smaller pie. But what if the size of the pie is increased by the tariff? How does labor fare under these circumstances? An increase in real income for the economy as a whole is, of course, possible, provided that the tariff causes a sufficient improvement in the terms of trade to offset its interference with the allocation of resources. A substantial improvement in the terms of trade could take place, however, only if the foreign demand for the country's exports was inelastic; and in this event, as we have seen, there is a strong probability that the tariff, far from protecting the industries competing with imports, would actually injure these industries and lead to a transfer of resources from them to the export industries. This shift in resources would reduce the degree of scarcity of labor and thereby lead to a reduction in both its relative and its absolute return.

The conflict of interests which the preceding summary emphasizes is in sharp contrast to the doctrine of a harmony of interests which occupied such a prominent place in the work of many nineteenth-century liberal economists. The preceding argument has shown that, with respect to problems of commercial policy, the economic interests of such broad groups as manual workers, landlords, and capitalists are not likely to coincide. A policy of reducing tariffs may therefore be the source of widespread political cleavages, quite apart from the pressure which is inevitably exerted by the industries immediately affected. This, of course, is no argument against reducing trade barriers. Rather, it is simply an indication that the political conflicts inherent in tariff reduction may have a much broader base than would be supposed from concentrating one's attention upon the protected industries alone.

The fact that the influence of tariffs on the distribution of income can be a matter of considerable economic and political significance is demonstrated, I believe, by a well-known report on the tariff in

Australia, which was published in 1929.[22] This report, prepared by a committee of Australian economists at the request of the Australian prime minister, presented both the terms-of-trade argument and the distribution-of-income argument in favor of the Australian tariffs. The Australian economy is characterized by an abundant supply of land, relative to the supply of labor and capital; and Australia, therefore, has a comparative advantage in agriculture, particularly in wheat and wool. The committee argued that if tariffs were reduced, Australian manufacturing would be retarded and resources would be diverted from manufacturing to agriculture. But, since the world demand for agricultural products, especially the demand for wheat, is decidedly inelastic, it was felt that an increase in Australian wheat exports would lead to a substantial reduction in world wheat prices. In short, the eventual effect of the tariff reduction would be a considerable deterioration in the Australian terms of trade.[23] Much more important than the deterioration in terms of trade, however, was the effect which the committee expected a tariff reduction to have upon the distribution of income. In general, the labor component of most manufactured products is considerably greater than the labor component of agriculture. A shift of resources from manufacturing to agriculture would therefore lessen the relative scarcity of labor, thus reducing real wages and increasing rents. It was this adverse effect upon the distribution of income which the committee of Australian economists regarded as the principal deterrent to a general tariff reduction.[24]

[22] *The Australian Tariff: An Economic Enquiry* (Melbourne, Australia, 1929).

[23] *Ibid.*, p. 80.

[24] *Ibid.*, Part VII.

What can be said about the Australian point of view in the light of the discusison in Section II? In the abstract a good case can be made both for the terms-of-trade argument and for the distribution-of-income argument in favor of tariffs. ***But this is true only when each argument is considered separately.*** When the two are presented together, the validity of one of the two arguments becomes doubtful. It may well be true that the world demand for Australian wheat is inelastic, as the committee implies, and that a tariff reduction might therefore lead to serious deterioration of Australia's terms of trade. But if this is actually the case, then it is unlikely, as we have seen in Section II, that a tariff reduction would lead to a shift of resources from manufacturing to agriculture. When the Australian economy finally became adjusted to the tariff reduction, domestic prices of manufactured goods might actually be higher relative to agricultural prices than before the tariff was reduced. And, if this should happen, the reduction of tariffs would be the cause of a shift of resources *into* the protected industries, with a concomitant increase in the proportion of the national income accruing to workers. Paradoxical as it seems, the Australian manufacturing industries might be better "protected" and receive more encouragement under free trade than under a system of protective tariffs.[25]

[25] This statement, as well as subsequent remarks concerning the foreign trade of the Latin-American countries and the United States, requires one modification. The theoretical treatment in Sec. II was based upon the assumption that the protective duty was a general duty applicable to all or virtually all types of import. If this is not true, the final results will obviously differ somewhat from those presented in Sec. II. It is intuitively evident, for example, that a tariff on a particular commodity constituting a small part of total imports will increase the domestic price of that commodity relative to the prices of exports, even though the foreign demand for the country's exports is quite inelastic; for in this case

This idea is not new, Quite the contrary, it is implicit in much of the nineteenth-century work on the theory of reciprocal demand. Nevertheless, it is an idea which would no doubt be received with great incredulity, not to say outright disbelief, by the average Australian businessman. How, he might ask, could he possibly benefit from a reduction of the tariff on his own manufactures? To some extent his disbelief is probably a result of an instinctive and well-founded distrust of what the economist calls the "process of adjustment"; for, if Australia should attempt, after a substantial unilateral reduction of tariffs, to maintain her exchange at the old rates relative to other currencies, a new equilibrium in her balance of payments could be achieved only by a reduction in real income or by a general deflation of prices and costs. The businessman is rightfully suspicious of both of these "processes of adjustment." If Australia were willing to alter the foreign value of her currency, on the other hand, the adjustment to the new situation might be achieved in a less painful manner. Even in this event, however, it seems doubtful whether producers in the protected industries would concede that a reduction in tariffs would benefit them; for most of them would probably be unwilling to carry through the argument to its logical conclusion. Of course, if a typical producer were asked whether he would prefer a 50 per cent tariff with the pound sterling selling for 1.25 Australian pounds or no tariff with the pound sterling selling for 2.50 Australian pounds, he would probably immediately see the advantage to himself of the latter arrangement. And, if the demand for Australia's exports is really inelastic, this is precisely the sort of choice with which the producer is confronted; for, as we have seen, when the foreign demand is inelastic, there is a strong probability that the indirect effects of the tariff on the terms of trade will more than offset the direct effects on domestic prices. Nevertheless, if tariffs were actually reduced in Australia and if the Australian pound began to depreciate as a consequence, it seems highly probable that many businessmen would complain of their losses from the tariff reduction without associating the tariff in any direct way with their gains from the depreciation of their currency.

This tendency to look only at immediate effects and to ignore secondary consequences is well illustrated by Australia's tariff experience after the first World War, recounted by A. H. Tocker in the *Economic Journal*.[26] Under the pressure of a balance-of-payments deficit, Australian tariffs were substantially increased in 1921. The higher customs duties, together with Australian borrowing in London and a generally improved world economic situation, brought about a marked improvement in the balance of payments; and the Australian banks began to accumulate sterling balances in London. At that time Australia was on a sort of informal sterling-exchange standard, but with no legal commitment to maintain a fixed rate of exchange between the Australian pound and the pound sterling. The accumulation of sterling balances by the Australian banks in 1922 finally induced the banks to sell these balances at a discount, whereas in

the adjustment of the terms of trade will occur largely through price changes among the duty-free imports. Whether the presence of nontaxed imports requires a substantial revision of the conclusions of Sec. II depends upon the ratio of duty-free imports to total imports. But this is a question which I shall discuss in a later paper.

[26] "The Monetary Standards of New Zealand and Australia," *Economic Journal*, XXXIV (1924), 556–75.

1921 a slight premium on pounds sterling had prevailed. The decline in the Australian price of sterling was clearly a result, to some extent at least, of the higher tariffs; but, despite this obvious connection, there were complaints, according to Tocker, that the banks were deliberately pursuing an independent foreign-exchange policy that was detrimental to Australian business interests. "The Australian," said Tocker, "who recently complained that the banks were using their big balances in London to nullify the effects of the tariff, and to attack the protected Australian industries, voiced an economic truth more profound than he knew, and one quite beyond the power of bankers to control."[27]

Although it was a comparatively small incident, the Australian experience illustrates a rather widespread tendency on the part of businessmen to take account only of the immediate or direct effects of tariffs and to ignore their secondary or indirect repercussions upon exchange rates and relative costs. This attitude largely explains, in my opinion, why protective tariffs frequently are strongly supported by the industries directly affected, even though it is widely recognized, at the same time, that the demand for a country's exports is quite unresponsive to changes in price. With their constant and unremitting attention required in the solution of immediate and pressing problems of production and sales, few businessmen have either the time or the inclination to trace the final consequences of tariffs through all their various ramifications; and the price that is paid for this "direct" approach is an exaggerated idea of the effectiveness of tariffs in protecting home industries.

The tendency to exaggerate the effectiveness of tariffs in raising or maintaining the incomes of a country's scarce factors of production is by no means limited to Australia. Quite the contrary, it is a tendency which is perhaps even more pronounced in other countries, particularly in Latin America. Like Australia, the Latin-American countries have a comparative advantage in the production of foodstuffs and raw materials. Their leading exports include such products of agriculture and the extractive industries as coffee, crude petroleum, copper, sugar, cotton, nitrates, wheat, and meat.[28] Most of these exports are commodities for which the world demand is decidedly inelastic; and, since the Latin-American countries in many instances provide a substantial proportion of the world's supply of such goods, it seems likely that the external demand for their exports as a whole may be quite inelastic even over considerable periods of time. The Latin-American foreign trade, which consists largely of exporting primary products, for which the world demand is inelastic, in exchange for manufactured goods, thus has marked similarities to the Australian foreign trade. And, like the Australians, the Latin-Americans are dissatisfied with the distribution of national income which this type of trade engenders. Indeed, the problem of income distribution is probably a much more pressing one in many parts of Latin America

[27] *Ibid.*, p. 571. In citing these Australian experiences, I have no intention of casting a reflection upon the intelligence of any particular group. The so-called "direct" approach to international economics and the neglect of secondary repercussions are perhaps even more common in the United States. A typical example is the belief that in normal times export surpluses are desirable, while foreign loans are undesirable. This point of view is encountered with regrettable frequency in the halls of Congress as well as among Americans of other walks of life.

[28] For an excellent summary of the pattern of Latin-American trade see R. F. Behrendt, *Inter-American Economic Relations* (New York: Committee on International Policy, 1948), pp. 1–33.

than it is in Australia, for the Latin-American people as a whole have not benefited, as have the Australians, from the scarcity of labor in relation to natural resources. In other words, the Latin-American problem is not simply a problem of maintaining the standard of living in the face of a growing population but rather a problem of raising the standard of living as a whole.

Although Latin America's comparative advantage up to the present time has clearly been in the agricultural and extractive industries, the region as a whole has nevertheless had many areas of subsistence farming, in which the productivity of workers was extremely low; and one of the important economic purposes of the present move toward industrial development is to provide alternative and more useful employment for these low-productivity workers. Whether the current programs of industrialization will attain the various economic, political, and social goals which have been set for them is a question which cannot be discussed here. My purpose in mentioning the Latin-American programs is simply to indicate their relation to the tariff problems analyzed in this paper. To a very considerable extent the governments of South and Central America have sought to encourage domestic manufacturing by means of tariffs upon the importation of competing products; and, in view of what has been said above, it seems probable that this particular part of the program may contain a basic inconsistency.[29] If the demand for Latin America's exports as a whole is actually inelastic—and there is little reason to doubt this—the preceding discussion suggests strongly that tariffs may accomplish little either in protecting Latin-American manufacturing or in increasing the share of the workers in national income.

This does not mean, of course, that the tariffs entail no economic benefits to the countries imposing them, but the benefits may be quite different from those originally contemplated. With the low price elasticity of demand for their products, the countries of Latin America are in a particularly good position to employ tariffs as a means of achieving more favorable terms of trade. A favorable movement in the Latin-American terms of trade, however, means an increase in the prices received for exports relative to the prices paid for imports; and, to the extent that such a shift occurs, part or all of the protection intended for domestic manufacturing is wiped out. In other words, since tariffs do not alter the basic techniques of production, any benefits which they confer upon one industry or one segment of the population are likely to be at the expense of another industry or another segment of the population. The Latin-American tariffs cannot, at the same time, benefit industry at the expense of agriculture and benefit agriculture at the expense of industry; and, although these tariffs are imposed upon manufactured goods, it is possible that, in the end, world conditions of demand may be such that the tariffs actually injure the industries which they are intended to protect. In the language of the foregoing discussion, the favorable movement in the terms of trade may more than offset the initial effects of the tariff in raising domestic prices of manufactured goods. And, even if the conditions of demand are not so extreme, it remains true, in any event, that the degree of

[29] The extent to which the Latin-American programs of industrial development depend upon tariff protection is indicated by a survey made by the United Nations (see United Nations, Department of Economic Affairs, *Economic Development in Selected Countries* [Lake Success, 1947], pp. 1–150).

protection afforded by Latin-American tariffs is much smaller than appears at first glance to be the case.

It should perhaps be emphasized that these remarks are by no means intended to imply that industrialization is a bad policy for Latin America. This broader problem, involving as it does sociological and political as well as extremely complex economic questions, is entirely beyond the scope of the present paper. My purpose here is simply to indicate one of the limitations to a policy of industrialization by means of protective tariffs.

The foregoing remarks concerning the influence of tariffs on the industrial development of agricultural countries bear a close resemblance to a proposition stated more than a century ago by Friedrich List. Although List thought that protective duties on manufactures are a useful means of promoting industrial growth, it was by no means his view that such duties are appropriate under all circumstances and at all stages of economic development. He divided the economic growth of a country into four periods, and it was in only two of these periods that he regarded protective duties as beneficial to manufactures. "In the first period, agriculture is encouraged by the importation of manufactured articles; in the second, manufactures begin to increase at home, whilst the importation of foreign manufactures to some extent continues; in the third, home manufactures mainly supply domestic consumption and the internal markets; finally, in the fourth, we see the exportation upon a large scale of manufactured products, and the importation of raw materials and agricultural products."[30] It was in the second and third of these periods that List thought protective duties would be effective in raising the level of industrial activity. With regard to countries in the first and fourth stages of development, free trade was preferred to protection. In other words, free trade was thought to be better than protection both for an undeveloped country specializing in agriculture and raw materials, and for a highly developed industrial nation. For the latter, tariffs on manufactures were considered unnecessary, since the industrial country had already achieved a strong competitive position in the world's markets for manufactured goods.[31] For the former, i.e., for the completely undeveloped country, List thought that tariffs were likely to defeat their purpose.[32] It is in this respect that his conclusions are similar to those given in the present paper, for it has been argued above that, in countries whose exports consist largely of primary products, tariffs will probably afford little, if any, encouragement to manufacturing.

The comparison must not be carried too far. Although List concluded, as I have above, that a policy of protection is a questionable method of increasing manufacturing output in an undeveloped country, his reasons for holding this view were not exactly the same as my own. According to List, a prosperous and powerful industrial nation must possess a well-developed commercial system in addition to its factories. And in the early stages of economic development List believed that free trade rather than protec-

[30] Friedrich List, *National System of Political Economy*, trans. G. A. Matile (Philadelphia, 1846).

[31] *Ibid.*, chap. iv.

[32] "The economical education of a country of inferior intelligence and culture, of one thinly populated, relatively to the extent and fertility of its territory, is effected most certainly by free trade, with more advanced, richer, and more industrious nations. Every commercial restriction in such a country aiming at the increase of manufactures, is premature, and will prove detrimental, not only to civilization in general, but the progress of the nation in particular . . ." (*ibid.*, pp. 78–79).

tion would promote this prerequisite to industrialization. Commercial enterprises would be encouraged because free trade would increase the volume of commercial transactions. In this manner an undeveloped country, according to List, would achieve a certain degree of economic and cultural sophistication more quickly under free trade than under protection. But, once this position was reached and the country was ready to begin the development of manufacturing, List believed that further economic progress would be promoted by protective tariffs.[33]

It is somewhat ironical that, by employing the classical method of comparative statics, I have reached a conclusion which, in one respect at least, is in agreement with one of the most anticlassical economists of the nineteenth century. List's approach to the problem was highly dependent upon a dynamic theory of economic development and involved, in addition, a liberal admixture of political considerations. My own approach, by contrast, has been static in character and limited exclusively to economic arguments. But both the dynamic and the static approaches have led, in one respect, to the same conclusion. It is a moot question whether List, in advocating free trade for backward countries, could have had in mind some of the arguments advanced in the present paper concerning the elasticity of demand for raw materials and agricultural commodities. In view of his aversion to classical economics, however, such a possibility seems rather remote.

The arguments in favor of free trade for undeveloped countries, whether stated in List's terms or in the terms of the present paper, might be called "infant-country" arguments for free trade, just as the arguments for protection of undeveloped industries have generally been called "infant-industry" arguments for protection. And just as the latter, in practical application, frequently raise difficult questions concerning exactly what constitutes an infant industry, so the former also raise questions as to what constitutes an infant country. In discussing the tariff history of the United States, for example, List assumed that by the early decades of the nineteenth century the United States had passed beyond the primitive and undeveloped stage in which free trade would have been beneficial. He believed, in other words, that tariffs were helpful in promoting manufacturing in the United States throughout the early part of the nineteenth century.[34] In order to substantiate or refute this assertion from List's point of view, it would be necessary to make a detailed factual study of the state of American agriculture and commerce at the time. But if the question is approached from the point of view of the present paper, there is at least one circumstance which suggests that the actual degree of protection to American manufacturing may have been considerably less than intended and considerably less important in American economic development than List supposed. Throughout the first half of the nineteenth century the United States was in a position, as far as foreign trade was concerned, quite like the position of Australia and the Latin-American countries today. She was predominantly an exporter of raw materials and agricultural products and an importer of manufactured goods. Thus, in the period from 1820 until the outbreak of the Civil War, American exports of raw materials and unprocessed foodstuffs accounted for

[33] *Ibid.*, pp. 181–82.

[34] *Ibid.*, chap. ix.

more than two-thirds of the total value of exports.[35] Moreover—and this is perhaps even more important—approximately three-fourths of these exports of primary products consisted of raw cotton, of which the United States at the time was by far the most important source of world supply. In view of the dominant position of the United States in the world cotton market and in view, further, of the dominance of cotton and other primary products in American exports as a whole, there is a strong probability that the demand for American exports during the first half of the nineteenth century was inelastic with respect to price. If this conjecture is correct, it follows from the analysis above that, considering both the primary and the secondary effects of the tariffs on domestic prices, the policy of protection to manufactures must have had a relatively small effect upon the rate of industrial growth in the period before the Civil War. Indeed, the net effect of protection during this period may even have been slightly adverse to manufacturing as a whole.[36]

The conjecture that early American tariff policy probably exerted a comparatively minor influence upon the growth of domestic manufactures is in substantial agreement with the well-known conclusion which Taussig reached by a somewhat different method. After a detailed study of a number of protected industries, including the textile and iron and steel industries, Taussig concluded that their rate of expansion had not been substantially affected by the ebb and flow of protective measures. Thus, in discussing the period before 1860, he said in his *Tariff History of the United States:*

> . . . In the main, the changes in duties have had much less effect upon the protected industries than is generally supposed. Their growth has been steady and continuous, and seems to have been little stimulated by the high duties of 1842, and little checked by the more moderate duties of 1846 and 1857.[37]

In his *International Trade*, published thirty years later, Taussig recognized the special nature of United States exports during the first half of the nineteenth century—i.e., the high proportion of raw materials and agricultural products for which the world's demand was comparatively rigid—but there is no evidence that this feature of American trade had anything to do with his original conclusion concerning the effects of protective duties.[38] His views regarding the early tariffs were largely derived from empirical observation, and, when he later studied the history of protected industries during the years 1860–1930, he modified his earlier opinions somewhat.[39] In particular, he cautiously advanced the view that the protective system may have contributed to the development of American manufactures.

At first glance, this later conclusion of Taussig's seems to contradict the argument of the present paper that exporters of raw materials and other primary products are not likely to find a general tariff system, short of completely prohibitive duties, an effective means of promoting

[35] These and subsequent figures on United States foreign trade have been computed from data in United States Department of Commerce, *Statistical Abstract of the United States.*

[36] This statement, like others in the present section, must be interpreted in a long-run sense. There is no intention to deny that during the period of adjustment a tariff on a particular product may afford the protected industry a substantial measure of protection.

[37] F. W. Taussig, *The Tariff History of the United States* (4th ed.; New York, 1898), p. 152.

[38] F. W. Taussig, *International Trade* (New York, 1928), p. 148.

[39] See F. W. Taussig, *Some Aspects of the Tariff Question* (3d enl. ed.; Cambridge, Mass., 1931), *passim.*

industrial development. A further examination of the statistics of United States exports, however, resolves at least a part of this apparent conflict. Although foodstuffs and raw materials, particularly raw cotton, continued throughout the nineteenth century to be important United States exports, these products, with the passing of the years, nevertheless became considerably less significant, relative to total exports. At the close of the nineteenth century, for example, exports of primary products accounted for less than half of total exports, compared with a proportion of two-thirds in 1830. The decline in the relative importance of primary exports was, of course, accompanied by a corresponding increase in the importance of manufactured exports. Thus, during the second half of the nineteenth century, American exports were not dominated by primary products to the extent that had been true earlier. Increasingly the United States was becoming an exporter of a wide variety of manufactures as well as the staple raw materials and foodstuffs. It follows that, with regard to the second half of the nineteenth century at any rate, there is no conflict between the results of this paper and Taussig's conclusion that the tariff system provided a limited stimulus to manufactures; for the United States after the Civil War was rapidly developing beyond the simple stage of an agricultural exporter.[40] The character of American exports was changing sufficiently to reduce some of the earlier rigidity of foreign demand and, accordingly, to make tariffs more effective in increasing the domestic prices of the protected products.

[40] A further factor in the increasing effectiveness of tariffs in protecting domestic industries was the lower proportion of dutiable imports to total imports.

IV

In concluding this paper, a word should be said about the relation of the arguments presented here to the earlier work of Heckscher and Ohlin. As noted in Section I, the well-known view of both Heckscher and Ohlin is that international trade tends to equalize the relative returns to different factors of production among the trading countries. In other words, it is their view that trade increases the relative demand, and therefore the relative return, of the factor of production which is comparatively most abundant and comparatively cheapest in a particular country. In this manner wages tend to be raised relative to the returns to other factors of production, in countries which have a large population in relation to their other resources. Superficially it might seem that any measure, such as a tariff reduction, which reduces the impediments to international trade, would have these same effects. In a country with a large supply of land, for example, it might be expected, following the Heckscher-Ohlin argument, that a tariff reduction would increase rents and lower wages. But we have found in Section II that, if the demand for a country's exports is inelastic, this result does not necessarily follow. Under some conditions with respect to international demand a reduction of tariffs may *increase* the demand for a country's scarce factors and *reduce* the demand for its abundant factors. How can this conclusion be reconciled with the view of Heckscher and Ohlin that international trade always increases the demand for a country's abundant factors?

Despite superficial differences, the conclusions reached in this paper are essentially consistent with those of Heckscher and Ohlin. The contradictory ap-

pearance of the conclusions is attributable entirely to a difference in the point of comparison. When Heckscher and Ohlin say that international trade increases the demand for a country's scarce factors, they mean that the demand is increased *compared with the demand in a state of complete isolation*. In other words, they are comparing free trade or restricted trade with a state of affairs in which there is no trade at all; and this is by no means the same as comparing trade under one tariff system with trade under smaller tariffs. The argument presented in Section II, that an increase in customs duties may reduce the demand for a country's scarce factors of production, was limited in its application to tariff changes within a range for which the foreign demand for the country's exports had a certain degree of inelasticity. In other words, the argument was valid only for movements along a limited part of the foreign reciprocal demand schedule. Now, in order to make the present analysis comparable to that of Heckscher and Ohlin, we should have to consider an increase in tariffs so large that all imports were eliminated. In short, all tariffs on all commodities would have to be completely prohibitive. From the nature of the reciprocal demand schedules, however, it is apparent that if tariffs were gradually increased to a level where they threatened to cut off all trade, the point of equilibrium would sooner or later move to a position where the foreign demand for the tariff-imposing country's exports was elastic. Thereafter, any further increases in tariffs would increase the demand for the country's scarce factors and reduce the demand for its abundant factors, in the manner envisaged by Heckscher and Ohlin. When the present technique is applied to changes in foreign trade as great as those envisaged by Heckscher and Ohlin, my conclusions are thus in agreement with theirs. An appearance of conflict arises only when one attempts to apply to the entire reciprocal demand schedule an argument which is applicable only to a segment of that schedule.

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ECONOMICS OF SCHEDULING FOR INDUSTRIAL MOBILIZATION

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I. RELATION BETWEEN STRATEGIC REQUIREMENTS AND PRODUCTION SCHEDULES

AN EFFECTIVE program of national economic controls to be implemented in the event of a future emergency requires spadework on the primary level by the military services and the individual contractors.[2] The initial impact of war is upon the manufacturing enterprises that comprise the nation's industrial structure. Plants already engaged in military production must immediately accelerate output from a job-shop to a volume-production basis. Most producers engaged in civilian activities have to close normal assembly lines and convert to volume production of entirely different types of end-items. For these aims to be achieved, the complete production process must be rationalized into a series of logically interrelated steps that will permit the parts and components entering into the finished products to be assembled in the least possible time.

In the reshaping of the organizational structure of individual plants to a high-volume basis there is the attendant problem of assuring availability of the resources required by the plants. These resources, in the aggregate, represent the total military load that will be imposed upon the nation's factories in the event of industrial mobilization and influence significantly the extent to which the output of normal peacetime production can be maintained. The point of departure for this complex procedure of building up individual plants into a full-blown wartime industrial structure and for ascertaining the supporting resources requirements is the strategic plan of the Joint Chiefs of Staff (J.C.S.). The importance of this plan in the development of an effective and economical industrial mobilization program was emphasized both by the President's Air Policy Commission in its analysis of the problem of national survival in the air age[3] and by the Congressional Aviation Policy Board in its report on aviation policy.[4]

The strategic requirements issued by the J.C.S. are of a general nature, however, covering such factors as estimated theaters of operation and the type of warfare that will be conducted. Hence these requirements cannot be translated directly into pounds of raw materials, quantities of components, and numbers of workers. To make this transition possible, the requirements must first be converted into production schedules for specific manufacturers. From these production schedules the supporting resources load can be determined, the probable impact upon the nation's econ-

[1] Robbins is industrial-planning specialist and Murphy industrial-planning economist of the Air Materiel Command. This article expresses their personal views and does not necessarily represent those of the Air Materiel Command.

[2] Yet the formulation of the service-industry aspect of industrial mobilization into a body of recognized principles has received comparatively little attention in the literature on war economics. For a discussion of this problem see S. M. Robbins and T. E. Murphy, "Industrial Preparedness," *Harvard Business Review*, XXVI (May, 1948), 343–47.

[3] *Survival in the Air Age* (Washington: U.S. Government Printing Office, 1948), p. 29.

[4] *National Aviation Policy* (Washington: U.S. Government Printing Office, March 1, 1948), p. 6.

omy calculated, and the necessary control measures formulated to minimize economic dislocations and assure the optimum distribution of resources. Thus, the industrial mobilization production schedules developed by the military services influence directly the extent of national economic controls that must be formulated by the National Security Resources Board and the Munitions Board, the top planning agencies established by the National Securities Act of 1947.[5] If these schedules are low compared to eventual requirements, plants may find that they have not adopted the preparedness measures necessary to meet strategic needs. Consequently, the effectiveness of the entire war plan may be impaired, and national controls developed as a result of these schedules may be inadequate to cope with the eventual effect of mobilization on the economy. Conversely, if the schedules developed are high in comparison with actual needs, considerable funds and time may have been expended on unnecessary planning. It is manifest, therefore, that conversion of requirements into accurate production schedules is absolutely essential to a successful program of economic mobilization.

Translation of strategic requirements into production schedules involves four major phases: (1) the requirements must be distributed among facilities; (2) management organizations must be assigned to operate these facilities in the event of war; (3) the peak capacity which each facility is capable of attaining under emergency conditions must be determined; and (4) the time required from M-Day to reach these peaks must be calculated.

Probably the most difficult problem is to establish the maximum rate of acceleration in reaching the peak output scheduled. To a large extent, this problem represents the heart of the scheduling procedure. This paper analyzes the theory and economic implications of some of the principal scheduling techniques used in World War II or developed in the current postwar period.

II. WORLD WAR II EXPERIENCE IN SCHEDULING

During World War II aviation catapulted from an industry of minor stature, ranking forty-fourth in the country, to the greatest industry in the history of the world. At peak output the annual value of aeronautical products exceeded $20 billion, or five times that of the automotive industry during the years of its largest peacetime production.[6] Because of the significance of aircraft output in the event of war and of the extensive planning between the years 1941 and 1945 a study of scheduling techniques must consider the experience of the government in planning aircraft schedules during World War II.

SCHEDULING ORGANIZATION

Immediately after the president's proclamation of a 50,000-plane program in May, 1940, steps were taken to administer the national defense program through the creation of the National Defense Advisory Commission (N.D.A.C.). William S. Knudsen, who was appointed commissioner of industrial production, organized a production division of N.D.A.C. The aircraft section of this division assumed responsibility for managing aircraft production and by June, 1940, had already produced valuable studies on major segments of the aircraft

[5] *National Security Act of 1947* (War Department Bull. 11, July 31, 1947).

[6] Guaranty Trust Company of New York, *Guaranty Survey*, Vol. XXIII, No. 12 (March 28, 1944).

industry.[7] Although its name and organizational position were frequently changed, this section continued to function as the responsible agency for controlling aircraft production throughout the war.

To co-ordinate the procurement activities of the various services, the Joint Aircraft Committee (J.A.C.) was formed on April 22, 1941. In addition, an Aircraft Scheduling Unit was established at Wright Field to act as a central clearing agency for all equipment and materials necessary to maintain the J.A.C. approved schedules. This unit functioned during the war under the aircraft-production agencies in Washington, particularly the Aircraft Resources Control Office (A.R.C.O.), which, with respect to manpower, materials, and machine tools, was the executive agency of the Aircraft Production Board, a W.P.B. subsidiary.[8]

The A.A.F.[9] did not develop a master scheduling organization until well into 1943. In that year the over-all strategic requirements outlined by the Joint Chiefs of Staff were converted into preliminary production schedules by headquarters in Washington and were then adjusted by the Materiel Command (now Air Materiel Command) to reflect shortages of manpower, materials, and other factors that might affect production. These schedules, after co-ordination with manufacturers, were known as "accepted schedules" and were retransmitted to headquarters, Washington, for discussion with A.R.C.O. and final approval by the J.A.C. and the Aircraft Production Board.

METHODS OF SCHEDULING

Scheduling began, on an informal basis, with a meeting of the production division of N.D.A.C. on July 23, 1940. At this meeting agreements were reached as to the number of aircraft required and as to their allocation to the Army, Navy, and British. Report 8, issued on August 22, 1940, by the N.D.A.C. and based upon the agreement reached in that meeting, did not meet the president's objective of 50,000 planes. In all, a total of slightly over 40,000 planes was scheduled, with a maximum production of 3,000 in any one month.[10] Thereafter, Reports 9 and 10 for engines and propellers were issued. From August, 1940, through the first quarter of 1943 twelve separate reports of the 8, 9, and 10 series were promulgated. In the initial reports of the 8 series an attempt was made to develop realistic schedules; but in the latter series this policy was abandoned in favor of a program based on the president's request for 60,000 planes in 1942 and 125,000 in 1943.[11]

Although the Aircraft Scheduling Unit was not primarily responsible for preparing schedules, a study was made in the spring and summer of 1943 of the capaci-

[7] Report 1, "Military Air Force of the United States (Present and Anticipated)," was issued on June 11, 1940. Report 2, "Aluminum Alloy Requirements for Airframes, Engines and Propellers, 50,000 Plane Program," was issued on June 14, 1940. Report 3, "Report on Army and Navy Program for Procurement of Airplanes and Engines," was issued on July 1, 1940. Other studies followed, all intended to lay a firm foundation for a program. None attempted to schedule aircraft requirements.

[8] Historical Office, Air Materiel Command, *The Allocation and Control of Aircraft Production Materials, 1939–1945* (Wright Field, January, 1948), chap. i *passim*.

[9] Known as the United States Air Force since passage of the National Security Act of 1947, which created a separate Department of the Air Force.

[10] Division of Research, Graduate School of Business Administration, Harvard University, *Problems of Accelerating Aircraft Production during World War II* (October, 1947), p. 26.

[11] Aircraft Resources Control Office, *History of the Aircraft Resources Control Office of the Aircraft Production Board and Predecessor Agencies* (Washington, September 29, 1945), p. 33.

ty of industry to produce aircraft with available resources. This study resulted in discarding the 8 series schedules, in favor of the W- and WE-series, or working airframe and engine schedules.[12] The W-series were more reliable than the preceding 8 series because the following limiting factors were reviewed in establishing these schedules:

a. The manufacturers' capacity to produce in terms of man-hours and floor area available, with consideration given to the relative preference rating;

b. Studies relating to the availability of engines, propellers, other GFE components, materials, and manpower;

c. The tactical requirements of the Military Services in the light of the contingencies mentioned above.[13]

The initial working schedule was issued as case 4040, following approval by the J.A.C. on May 6, 1943. Thereafter four separate W-schedules were issued monthly until September 30, 1943, when the J.A.C. approved the recommendation of the Aircraft Production Board that W-series schedules be issued quarterly. This practice was followed to the end of the conflict.

The system of reports collected by the A.A.F. and Navy during World War II, known as Aeronautical Monthly Progress Reports (A.M.P.R.), furnished the basic information for checking the reality of prepared schedules against manpower and floor-area requirements. These reports enabled the services to establish rough measures of floor-area productivity, the most useful being pounds per square foot of floor area. The "target" requirements of any desired model could be translated into pounds and these pounds into square feet, which could, in turn, be compared with size of facility.

The W-series schedules were carefully checked against manpower requirements and known labor-market conditions. The A.M.P.R. permitted the development of a satisfactory method of computing labor requirements. This method called for a monthly aircraft schedule which was multiplied by the estimated cost in terms of direct man-hours per unit. Direct man-hours per unit, were obtained at stated cumulative plane numbers from so-called "learning" or "progress" curves.[14] The total monthly cost of scheduled aircraft was adjusted for a flow-time factor, since several months elapse before a plane is ready for acceptance. The adjusted direct man-hour load by month was inflated to account for monthly spares requirements. The total direct man-hour load was then divided by the average hours worked by direct workers each month, in order to obtain the average of direct workers needed to support the schedule. A relationship between direct and total workers was established, and the total labor load needed to support a schedule was computed. Manpower requirements were compared with estimated labor availability in a given labor-market area, and recommendations

[12] Aircraft Scheduling Unit, Aircraft Resources Control Office, Aircraft Production Board, "Report of September 30, 1945," in *The Allocation and Control of Aircraft Production Materials, 1939–1945*, Appen. V, p. 4.

[13] Army Air Forces, Air Technical Service Command, *History of AAF Activities during World War II in the Field of Industrial Manpower* (Wright Field, December 1, 1945), p. 25.

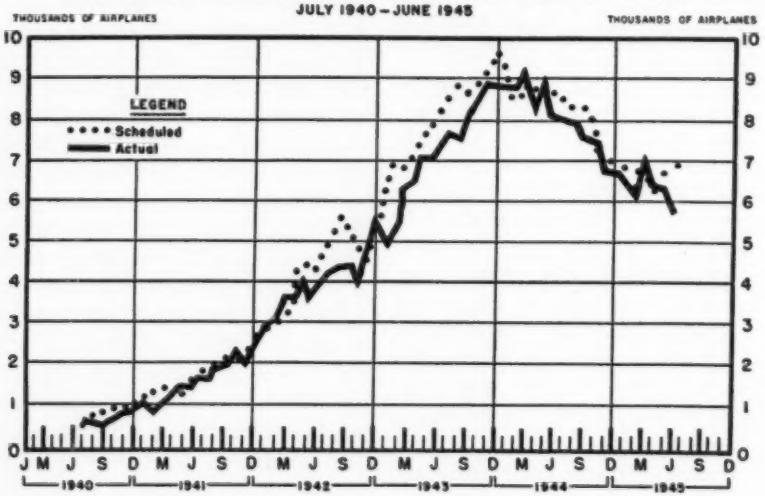
[14] Worker efficiency at repetitive operations improves with practice. Experience has shown that this rate of improvement tends to follow the curve $Y = ax^{-b}$, where Y equals direct man-hours per unit and x equals the cumulative unit-number produced. In the aviation industry each doubling of cumulative output during the war tended to result in a 20 per cent reduction in man-hour costs. Progress curves for manufacturers of refrigerators, ranges, and similar products generally reveal flatter slopes, which signify a slower rate of learning.

were made as to the feasibility of meeting the schedule under discussion.[15]

Though the W-series took into account factors other than manpower, the only formalized technique for scheduling aircraft adopted by the A.A.F. during World War II was based upon manpower. Other factors were discussed in monthly conferences, but the A.A.F. did not develop during World War II a comprehensive methodology for scheduling aircraft and components.

CHART I

SCHEDULED AND ACTUAL PRODUCTION OF AIRPLANES BY MONTHS
JULY 1940 – JUNE 1945



RESULTS OF AIRCRAFT SCHEDULING EFFORTS

The accuracy of scheduling efforts used during World War II may be measured by a comparison of schedules and actual production. If monthly comparisons are made of planes produced and planes scheduled for a particular month (Chart I), the record is favorable. This comparison, however, obscures the fact that, if the full range of schedules is compared with actual production, serious discrepancies become apparent. The major problem in scheduling is to forecast production accurately at least twelve months in advance. A more revealing comparison, therefore, is presented in Chart II, which shows the full schedules in effect during the course of World War II as compared to actual production of aircraft. Three principal conclusions may be drawn from this chart: (1) the early 8 series called for an unrealistically rapid acceleration of production; (2) the early 8 series also failed to schedule realistic peak requirements; (3) the W-series, though more realistic than the 8 series, were often revised; and no W-series succeeded in approximating the actual World War II production record of aircraft.

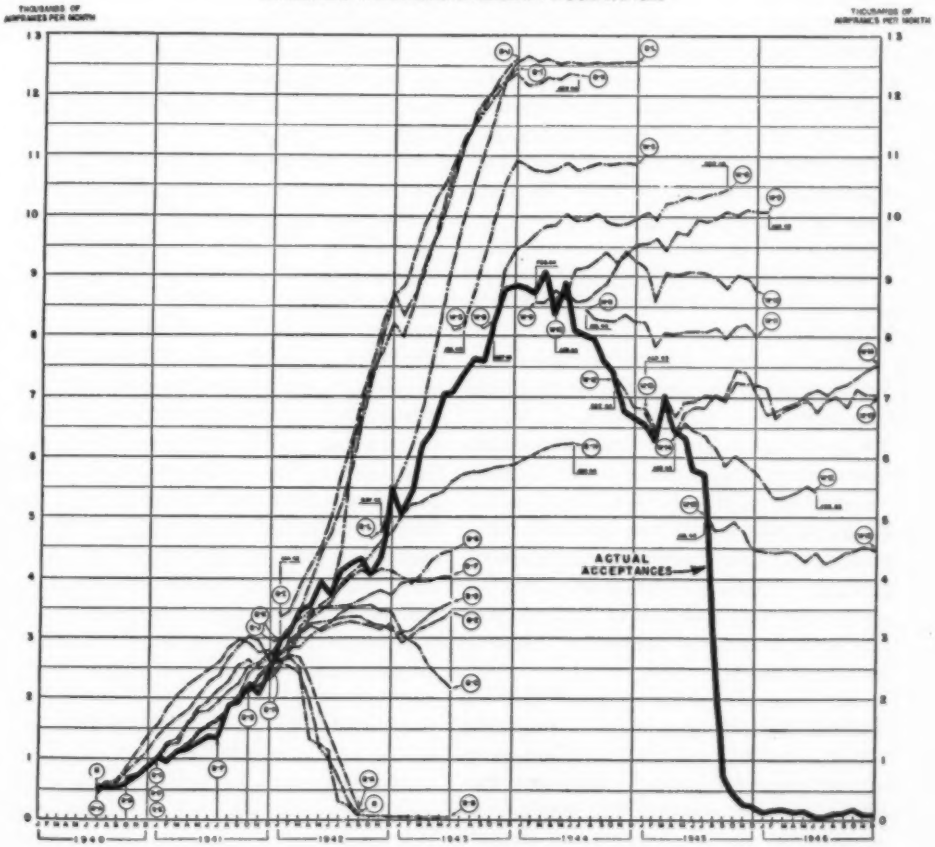
The magnitude of these discrepancies in scheduling had unfavorable economic repercussions. The overscheduling characteristic of the early 8 series tended to induce artificial bottlenecks in resources,

[15] *History of AAF Activities during World War II in the Field of Industrial Manpower*, chap. iii *passim*.

inasmuch as aircraft producers requested manpower, materials, and facilities to meet the initial high targets. The low peak rates of the 8 series, however, probably exerted a more adverse influence on production expansibility than did over-the high peak requirements in 1940 and 1941 meant a further delay in constructing an aircraft industry capable of fulfilling the needs of World War II. Not until December 30, 1941, when the 8-H aircraft program was published, did a

CHART II

COMPARISON OF WORLD WAR II OFFICIAL AIRCRAFT PRODUCTION SCHEDULES WITH ACTUAL AIRCRAFT ACCEPTANCES



scheduling.[16] The aircraft industry, accustomed to small orders prior to World War II, had never developed a high-production technique. Failure to schedule schedule call for over 50,000 planes, the president's stated program. Moreover, the concept of follow-on contracts was not introduced until December, 1941.[17] Until provision was made for continu-

[16] *Problems of Accelerating Aircraft Production during World War II*, p. 29.

[17] *Ibid.*

ance of production at a high monthly rate, an aircraft mass-production industry could not be developed in this country. High-production tooling could not be expected under a program calling for relatively small peak rates of output. The failure to schedule sufficiently high requirements impeded the progress of the aircraft program.

The 8 series and the W-series were frequently changed during the war. For example, during 1944 when scheduling of aircraft was on a fairly realistic basis, the following aircraft schedules and amendments were issued by the program co-ordination division of A.R.C.O.: W-9 on January 13; W-10 on April 13; W-11 on July 13; and W-12 on October 12. W-9 was amended fifty times; W-10, fifty-nine times; W-11, sixty times; and W-12, forty-three times.[18]

These frequent changes disrupted the master-scheduling activities of airplane contractors and retarded output. Moreover, changes in airplane schedules meant an extensive revision in the operations of hundreds of related companies, including subcontractors, vendors, and producers of government-furnished equipment.[19] Finally, these schedule inaccuracies were reflected in the necessity for costly revision of tactical and operational plans.

The literature, prior to World War II, contained little discussion of scientific means of scheduling aircraft. There are, of course, mitigating circumstances which in part explain the neglect of scheduling. The procurement of aircraft prior to Pearl Harbor was very low, and the magnitude of production required by a future war was not realized. Sufficient funds were not available for adequate peacetime procurement or for the purchase of advance preparedness measures.

Thus, although World War II produced major advances in the techniques for scheduling, no objective methodology was developed for use in the event of future hostilities. Following V-J Day the agencies engaged in aircraft scheduling were disbanded. With the creation of the National Security Resources Board and the Munitions Board, however, scheduling by the services based upon over-all tactical requirements established by the Joint Chiefs of Staff has assumed greatly increased significance.

The N.S.R.B. and Munitions Board are responsible for consolidating the scheduled requirements of the services and for reviewing these needs in the light of available national resources. In order to insure an effective industrial mobilization plan for the country, it is imperative to develop, prior to the necessity for actual mobilization of industry, a sound method of forecasting production schedules. The following sections of this paper will be addressed to the solution of this problem, with particular emphasis on the scheduling of aircraft.

III. ELEMENTS OF PRODUCTION SCHEDULING

The basis of any attempt to develop mobilization schedules is knowledge of the productivity, type, and quantity of equipment that will exist on M-Day at each facility for which schedules will be planned. These data are indispensable in order to determine the initial acceleration attainable with existing production methods and equipment and to evaluate the new equipment that will be required

[18] Aircraft Resources Control Office, "Summary Report of ARCO Activities, 1944" (May 29, 1945), in *The Allocation and Control of Aircraft Production, 1939*, Appen. IV, p. 5.

[19] Aircraft Scheduling Unit, "Report of ASU Operations for the Year 1944," in *The Allocation and Control of Aircraft Production, 1939–1945*, Appen. III, p. 12.

to effect the desired peak expansion. For products of simple design the problem of change-over is generally not difficult. For such highly complex items as aircraft profound alterations in manufacturing methods and large quantities of special new equipment may be required. Let us examine the type of current data that will provide the basis for preparing schedules.

Initially, information must be available on the extent of production redesign that would have to be accomplished to undertake volume output. For example, in order to build great quantities of aircraft, the production process must be divided into a number of separate operations. Different parts of the plane must be constructed simultaneously in separate areas and finally assembled into the completed end-item in special buildings with suitable clearances and ceiling heights. The larger the volume of production desired, the greater the breakdown that will be necessary.[20] Since it is expensive to design planes to permit this atomization of the production process, present designs in many instances still reflect peacetime production methods. Therefore, in order to determine the acceleration rate a plant can achieve, an evaluation must first be made of the extent of production redesign necessary for the model being manufactured and the time required to effect these changes in design.

An extensive array of automatic machine tools, special tools, and multipurpose equipment will be necessary to produce in accordance with high-volume design. During peacetime, manufacturers will not maintain these costly tools, for they are unnecessary for limited production and would entail burdensome overhead. In the event of mobilization, however, an immediate need for this equipment will be created. In order to plan production schedules at a given facility, scheduling authorities must gain some insight into the equipment already at the plant, the additional tooling that will have to be acquired, and the time that must elapse before the tooling will be installed and ready for use.

Expansion is obviously limited by the physical environment. Data must be gathered, therefore, describing the available plant, the amount of floor area used for current production, the total amount of floor area, the shifts scheduled, plant layout, and related statistics. These data will indicate the production acceleration that can be achieved by expanding the area used, by conversion, and by greater exploitation of the plant through increased shift utilization. If a plant is not already available, an estimate must be made of the time required to construct the plant and make it ready for use.

The information previously described may be obtained directly from companies and from published statistical reports. The data will establish the boundaries of possible production expansion within a given period of time. The first element for realistic scheduling, therefore, is a knowledge of the product, facilities, and equipment.

In the manufacture of large and complicated end-items many steps intervene between the mining of the basic raw material and its actual incorporation as formed metal parts into the finished product. After having been mined, the ore must be refined, mixed with other metals to form appropriate alloys, and poured into bars or billets. These bars are then extruded into tubes, rolled into

[20] Glenn L. Martin, "The Problems of Aircraft Development," *Elements of American Airpower* (Washington: Aircraft Industries Association, 1947), p. 149.

sheets, forged, or poured into castings. After heat treatment and other steps, the basic material is converted into the "processed material," which, in turn, can be fabricated and assembled into the finished end-items.[21]

A sharp expansion in production creates an immediate and greatly increased need for larger amounts of this processed material. But if the manufacturers had first to place orders for the materials at the mills, which would then set in motion the entire "ore-to-formed-metal" manufacturing processes, a serious delay would be incurred before expansion could even be initiated. Similar problems would be encountered in attempting to procure the numerous finished parts used in modern aircraft. To obviate this difficulty, some production specialists have recommended stockpiling of processed material, basic components, and parts in the prime contractors' plants.[22] The costs of these stockpiles could be reduced by rotating the items stocked. As the contract nears its termination, the materials could be used and new items substituted, thus minimizing obsolescence.

Whether or not planning measures of this type are undertaken, it is imperative to ascertain the extent to which enlarged inventories of processed materials and components are immediately available to meet the requirements of expanded production. This information will play an important role in determining the shape of possible production acceleration curves. Accordingly, the second element of production scheduling is a knowledge of the stocks of processed materials and components in contractors' plants and, if inventories are inadequate, the time required to procure sufficient supplies.

The preceding information provides the framework around which production schedules can be built. The shape of the production-acceleration curve, however, will be largely determined by the plant's ability to absorb labor efficiently.

The capacity of a manufacturer to absorb large accretions of manpower depends upon a number of factors. The complexity of the item to be produced will influence the curve of labor-learning; the degree to which the plant's operations are mechanized will also affect the rate of learning; and the amount and type of labor supply in the area, together with the efficiency of supervisory management, will significantly influence the degree of new training required. In addition to an analysis of the influence of these factors upon production acceleration, an estimate must be made of on-the-job training time needed to fit the new workers to their assignments. The solution to this problem, therefore, requires special attention. An arbitrary decision or an incorrect conclusion can set off a chain of misunderstandings that could seriously affect the nation's productive capacity. World War II experience demonstrated that manpower is likely to prove the most persistent problem in any future mobilization. The third important element in establishing a production schedule is the determination of the plant's ability to absorb increased amounts of manpower.

These three elements—status of the product, facility, and equipment; status of processed materials and components; and projected rate of manpower absorption—comprise the minimum tools necessary to develop realistic production

[21] J. H. Kindelberger, "Problems of a Rapid Expansion of Airframe Production in a Future War," *ibid.*, p. 102.

[22] *Ibid.*, p. 103. The stockpile of processed metals at contractors' plants must be distinguished from the national program of stockpiling basic metals, ores, and other critical and strategic materials (Public Law 520).

schedules. Having established these elements, we must determine how they can be combined to provide accurate monthly production forecasts. Various techniques may be used.

IV. TECHNIQUES OF SCHEDULING

The problem of scheduling requirements may be divided into two parts: (1) a peacetime program, in order to assure that plants have been selected and quantities of airplanes have been distributed so as to provide the optimum base for expansion to meet mobilization requirements; (2) scheduling a mobilization program from the peacetime base. These two problems are closely interrelated, inasmuch as skilful peacetime scheduling will permit more rapid mobilization acceleration. The first problem is more difficult, since there are many possible combinations of a peacetime program. For example, from various assumed peacetime bases expansibility may be computed and the program leading to optimum expansibility chosen; but this method involves trial and error and would result in lengthy and cumbersome procedures.

Once the peacetime base has been established, the problem of determining the most appropriate mobilization schedules is primarily one of developing the soundest possible technique. Let us examine two techniques which have been formulated. The first is a quick method which leans heavily upon World War II experience for its conclusions. The second exploits more fully the basic elements of expansibility described in Section III and is probably the more reliable.

A QUICK METHOD OF PRODUCTION SCHEDULING

Evaluation of World War II experience has disclosed the existence of certain characteristic factors and relationships that can be used to estimate production schedules. Of these, the following are of major importance: (1) peak capacity, which can be determined by employing a statistical factor based upon pounds of airframe attainable per square foot of floor space; (2) elapsed time, which can be used to establish the time interval between any point in the production process (e.g., first direct man-hours) and first delivery; (3) production build-up, which is a function of pounds to be produced at peak and is best expressed as a straight line on double logarithmic paper.

By utilization of these factors production schedules can be developed with a minimum expenditure of time and effort. Prior to utilizing this method, however, it must be determined whether or not the facility is physically capable of manufacturing the product assigned. For example, small plants with limited bays and ceiling heights cannot be used to manufacture a plane as large as the B-36, while, conversely, it would be uneconomic to utilize specially designed plants to produce standard items of equipment. The requisite descriptions of facilities may be obtained from government releases,[23] supplemented where necessary by direct checks with the companies.

If the plant is physically capable of manufacturing the product desired, the initial step in the method is to establish the peak production that can be obtained from the facility. This peak output establishes the upper limit of the production-acceleration curve.

For airframe plants, peak production can be determined by applying a predetermined factor of pounds per square

[23] See, e.g., War Assets Administration, Office of Real Property Disposal, *Plant Finder: A Buyer's Guide*, and descriptions of specific plants issued by the Defense Plant Corporation, R.F.C. These descriptions contain particularly useful pictures and reproductions of scale drawings.

foot of total floor space to the total available area.[24] In the making of this calculation care must be exercised to convert the floor-area factor to a three-shift basis, since under conditions of mobilization it can be assumed that plants will be fully utilized. If the peak capacity of the facility is below peak scheduled requirements, after allowance for maximum subcontracting, a new choice of facility must be made. If the peak capacity equals or exceeds scheduled requirements, the next step is to determine the monthly build-up to peak requirements.[25]

Studies have indicated that a close correlation exists between the size of a program, in terms of airframe pounds, and the months required to attain the program. By the use of the estimating equation of the least-squares line fitted to the scatter of points representing World War II peak production for each program and the number of months required to reach this peak, a table can be constructed revealing the number of months needed to reach varying levels of peak output. The probable number of months to attain the scheduled peak requirements can be determined by referring to this table. Inasmuch as World War II experience has demonstrated that production acceleration tends to follow a straight line on log-log paper, the production curve can then be estimated by drawing on log-log paper a straight line between one delivery in the first month[26] and peak deliveries at the month determined in the table previously described. In the event that a company is already in production, the build-up schedule may be adjusted to reflect the number of months still intervening between the current level of production and the peak.

Once the production build-up curve has been established, its exact location with respect to time must be fixed. This point is determined by the date at which mobilization is assumed to begin (M-Day). If the plant is already in production, the monthly schedule can be read from the acceleration curve starting from the level of production on M-Day. If the model is not in production, the number of months intervening between M-Day and the month of first delivery must be determined. This can be accomplished by estimating as of M-Day the position of the model in the sequence of production operations. World War II experience can be examined to determine the average number of months that are required to move from the production stage on M-Day to first delivery.[27]

An important shortcoming of this method is its heavy reliance on World War II experience. Statistical analysis of World War II data reveals considerable dispersion around the averages, thus introducing the possibility of error in developing schedules based upon these data. A principal reason for this lack of homogeneity is the fact that the industry mushroomed rapidly during the war. In more mature industries, such as the automotive, where production processes have

[24] The services have made extensive analyses of World War II experience to determine the relationship between square feet of floor space and pounds of production.

[25] For aircraft, peak scheduled requirements may be estimated by use of the following simple formula:

$$P = S[W(1 - O_p)(1 + S_p)],$$

where P = peak production in airframe pounds, S = monthly units scheduled at peak, W = airframe unit-weight, O_p = percentage of subcontracting at peak, S_p = percentage of spare parts at peak.

[26] This relationship does not hold true in the first few months when production operations have not been stabilized.

[27] Elapsed time studies of this type have been undertaken by the Air Force.

become largely stabilized, the data tend to show less dispersion.

A REFINED METHOD OF PRODUCTION SCHEDULING

A more accurate method of production scheduling, which takes into account the significant factors currently affecting output, can be developed. This technique requires a thorough analysis of the factors of expansibility described in Section III.

The principle underlying this method is that production-acceleration curves are largely governed by the rate of manpower absorption. Most aircraft companies maintain comprehensive labor-cost records permitting the formulation of reasonably accurate direct man-hour build-up curves. Through simple statistical application these man-hour curves can be translated into delivery schedules.

The initial step in this methodology,[28] as in the quick method, is to determine whether or not the product can be manufactured at the plant. Since this method revolves around direct man-hour expenditures, a determination must then be made of the time that will elapse between M-Day and expenditure of the first significant amount of direct man-hours. This time is represented by AB in Figure A of Chart III.

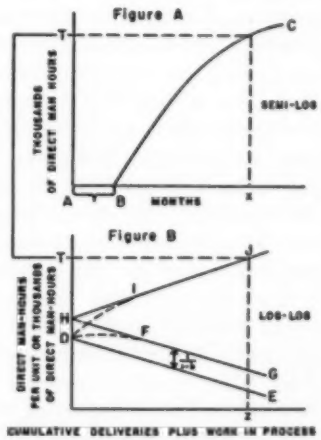
This distance is determined by analysis of such factors as (1) rate of peacetime production; (2) position of the model in the sequence of operations from "go-ahead" to first delivery; (3) ability of the plant to build the aircraft in question, from both a structural and capacity point of view; (4) the position of the model relative to manpower and materials availability; (5) equipment as a possible bottleneck; (6) availability of components; (7) ability of management.

When a model is already in production on M-Day, this step is omitted, since direct man-hours have already been expended in the production process.

Thereafter, the build-up of direct man-hours, starting from the month of initial expenditure, must be determined. Establishment of this man-hour build-up curve is equivalent to the manpower absorption rate. This rate may be described by a curve chosen from a combination of World War II and peacetime experience. Thirty-two build-up curves, based upon World War II experience, have been isolated for the airframe industry. To narrow the possible range of choice and to center attention upon a specific build-up curve, factors such as the desired peak rate, the status of the product as "proved" or "new," the status of the

CHART III

GRAPHIC PORTRAYAL OF CONVERSION FROM CUMULATIVE DIRECT MAN-HOURS PER MONTH TO CUMULATIVE DELIVERIES PLUS "WORK IN PROCESS" PER MONTH



BC – CUMULATIVE DIRECT MAN-HOUR BUILD-UP CURVE.
DE – DIRECT MAN-HOUR PER UNIT LEARNING CURVE.
HG – AVERAGE DIRECT MAN-HOUR PER UNIT LEARNING CURVE.
HJ – CUMULATIVE DIRECT MAN-HOUR PER UNIT LEARNING CURVE

[28] J. R. Crawford, formerly of Lockheed, developed during World War II in a series of unpublished lectures the factual research underlying this method.

facility as "experienced" or "inexperienced," etc., must be studied. An example of such a curve is shown as *BC* in Figure A of Chart III.

The direct man-hour build-up curve indicates the cumulative man-hours expended by the facility in each month. These man-hours result in deliveries and "work in process."[29] The initial problem is to determine the number of deliveries and "work in process" in terms of equivalent units that will be produced each month. This determination is made by developing a progress curve for the model in question, by translating the progress curve—which shows actual direct man-hours per unit—into average direct man-hours per unit, and, finally, by converting the average direct man-hour-per-unit curve into a cumulative direct man-hour-per-unit curve. Thereafter, by locating a specified number of direct man-hours on the monthly cumulative direct man-hour build-up curve and on the cumulative direct man-hour-per-unit curve, the number of deliveries and "work in process" applicable to each month can be established. The "work in process" can then be separated from deliveries, resulting in an estimated production schedule. This procedure can be illustrated graphically.

As a first step in translating the direct man-hour build-up curve into a production schedule, a learning curve for the model in question is drawn on log-log paper.[30] This curve appears as *DE* in Figure B of Chart III and describes the direct man-hour cost of the airplane at successive cumulative plane numbers.

Curve *DE* is translated into a cumulative average direct man-hour learning curve by multiplying any two points on *DE* by $1/(1-b)$, where b is equal to the slope of curve *DE*.[31] Reference tables may be calculated to determine the value of $1/(1-b)$. *HG* in Figure B of Chart III represents the average direct man-hour-per-unit learning curve.

HG must then be translated into a cumulative total direct man-hour-per-unit learning curve. This can be accomplished by multiplying the value of the average direct man-hours per unit at two different cumulative plane numbers by the same cumulative plane numbers. This procedure establishes curve *HJ*.

Cumulative deliveries plus "work in process" can then be readily estimated as illustrated in Chart III. For example, at month *X*, in Figure A of Chart III, *T* cumulative direct man-hours would have been expended. Reference to Figure B, Chart III, shows that *T* cumulative direct man-hours will result in a cumulative total of *Z* deliveries plus a certain amount of "work in process." A similar procedure may be followed for each month.[32]

Cumulative deliveries may be separated from "work in process" by first establishing a "work-in-process curve."

[29] "Work in process" is expressed in equivalent units and consists of the backlog of parts and partially completed planes in the "pipe line."

[30] Cf. p. 33, n. 14. By plotting the equation of the learning curve $y = ax^{-b}$ on log-log paper, we obtain a straight line which facilitates extrapolation.

[31] The factor $1/(1-b)$ is derived as follows: In the equation of the learning curve, the sum of direct man-hours per unit (y) divided by the cumulative plane number (x) yields the average direct man-hours per unit at x. This average may be obtained by integrating $y = ax^{-b}$ and dividing by x where x is a large quantity. Thus:

$$\frac{1}{x}\int_0^x ax^{-b}dx = \frac{1}{x}\cdot\frac{ax^{-b+1}}{-b+1} = \frac{ax^{-b}}{-b+1} = \quad b\ \frac{1}{1-b}.$$

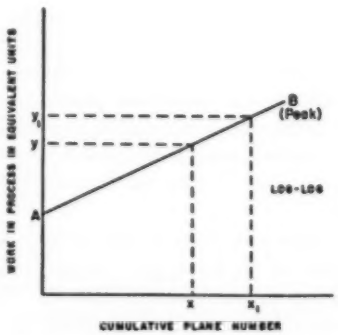
[32] The average direct man-hour-per-unit and cumulative direct man-hour-per-unit curves are not truly straight lines. In the early stages of production these lines are curved as illustrated in Figure B, Chart III, *DI* and *DF*. This fact introduces an element of distortion which will not significantly affect the calculation of the full schedule.

World War II experience has shown that a straight-line relationship on log-log paper exists between "work in process" and cumulative production. Diagramatically, this relationship appears as line AB in Chart IV.

To establish line AB, the number of equivalent units in process at first and peak acceptance must be estimated from a knowledge of the general policy of the plant that is to produce the model. A straight line can then be drawn on log-log paper connecting these two points.

CHART IV

RELATIONSHIP EXISTING BETWEEN CUMULATIVE PLANE NUMBER AND "WORK IN PROCESS"



This line represents the "work-in-process condition" to peak production.

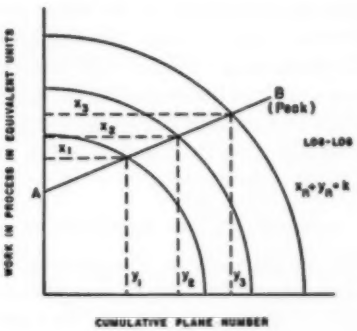
The number of cumulative deliveries plus "work in process" in equivalent units for each month covered in the production schedule have been determined. To segregate actual deliveries from "work in process" for each month, line AB in Chart IV may be used to develop a table showing "work in process" in equivalent units for each cumulative plane number.

Thus, at cumulative plane number X, "work in process" is equal to Y. At cumulative plane number X_1, "work in process" is Y_1, etc. Where the total of each X and Y value equals the cumulative deliveries plus "work in process," estimated from Figure B, Chart III, the segregation of deliveries from "work in process" has been accomplished.

This procedure is tedious and awkward. A more efficient process can be developed by plotting on a log-log trans-

CHART V

DIAGRAM ILLUSTRATING SHORT-CUT METHOD OF SEGREGATING "WORK IN PROCESS" AND CUMULATIVE DELIVERIES



parency a series of hyperbolas representing the constant sum of

$$X_n + Y_n = K .$$

Using the transparency placed over the "work-in-process line," as illustrated in Chart V, we can read estimates of cumulative deliveries from the X scale by dropping a perpendicular from the point of intersection of the hyperbola (with a value of K equal to cumulative deliveries plus "work in process" for a given month) with the line AB. Thus, if Chart III shows that 60 cumulative deliveries plus "work in process" would be obtained in a given month, cumulative deliveries can be obtained by taking the appropriate reading from the hyperbola

with a value of $K = 60$. By repeating this process for each month for which it is desired to develop a schedule, the monthly cumulative deliveries are derived. Differencing these estimates of cumulative deliveries results in obtaining the desired production schedule.

The principal shortcoming of this refined technique of production scheduling is the substantial amount of personal judgment involved. Errors in such significant steps as estimating the time that must elapse from M-Day to first input of direct man-hours, determining the slope of the cumulative direct man-hour build-up, the slope and level of the direct unit-man-hour curve, and developing a "work-in-process" curve may seriously distort the final production schedule. As a result, this method can be used only by individuals closely familiar with the aeronautical industry.

V. SUMMARY AND CONCLUSIONS

The superstructure of economic controls necessary to contain the pressures of war production rests upon the base of military-services requirements. To develop adequate controls, requirements must be estimated in advance. If enactment of controls is deferred until the outbreak of war reveals the quantities and types of matériel that will be required, substantial delays will be encountered before the mechanism of the nation's production potential can be geared to these requirements. Irreparable economic damage may result.

Military requirements for a future war, initially estimated by the Joint Chiefs of Staff, set in motion the chain of developments that may eventually lead to the formulation of national economic controls. The requirements are expressed in broad strategic terms and must be translated into models and quantities of end-items for each of the military services. The services must then convert these estimates into monthly production schedules for specific facilities. This conversion is essential in order to allocate the nation's facilities and to assess the resources load that will be placed upon the national economy. The production schedules then become the basis for calculating the manpower, materials, and other resources necessary to support the production schedule. Resources requirements are aggregated by the Munitions Board and used by the National Security Resources Board as a basis for developing programs of economic controls to insure the smooth functioning of the production system in a war emergency.

One of the significant cogs in the machinery for formulating national economic controls is the development of sound production schedules. If they are inaccurate, the resultant plans for obtaining the resources required are likely to be inadequate, with serious implications to the success of the entire war effort.

Considerable experience in the development of mobilization schedules was obtained during World War II. While valuable data were accumulated and important statistical factors formulated, considerable room for refinement and improvement remains.

Since the close of World War II, the air arms of the military services have been experimenting with improved techniques for scheduling an aircraft-production program. The problem of developing satisfactory mobilization schedules is particularly acute for the aeronautical industry because of the profound changes in production design and special tools and tooling required to shift the industry from the job-shop manufacturing method, characteristic of normal peace years,

to the high-volume methods necessary to meet the large production demands of war.

Two methods for developing aircraft mobilization schedules are described in this paper. The more refined technique entails extensive use of the basic tools of scheduling: status of product, facility, and equipment; status of "processed materials" and components; and projected rate of manpower absorption. This method, in essence, starts with a known condition of product, plant, and available materials and utilizes the estimated rate of manpower absorption as the principal determinant of the production schedule.

In order to formulate appropriate scheduling techniques, considerable further study is required. The primary goal of effective scheduling is to minimize the personal and qualitative elements, thus permitting increased consistency in developing similar schedules by different individuals starting from the same base. Until an objective means of scheduling mobilization production programs has been developed, uncertainty will cloud the whole procedure of developing national controls to assure the optimum war effort. The problem is sufficiently important to warrant the general attention of economists interested in war economics. It is a futile type of planning that results in the development of grandiose structures, with no regard to the soundness of the basic foundation.

AIR MATERIEL COMMAND

THE WELFARE ASPECTS OF EXCISE TAXES[1]

EARL R. ROLPH AND GEORGE F. BREAK

I

THE proposition has often been advanced that a commodity tax involves a burden on the taxpayer which an income tax of the same yield does not entail. The demonstration has generally been based in recent years upon the indifference map of an individual consumer.[2] This analytical device has now become thoroughly familiar, and we shall confine ourselves to a brief résumé of the usual arguments based upon its use.

In Figure 1 money income, M, is measured along the vertical axis, and quantities of a single commodity X along the horizontal axis. I_1 and I_2 are indifference curves for a single individual, being the loci of all combinations of X and M which yield him the same satisfaction. These curves, as representatives of his entire preference map between X and M, are assumed to remain fixed over the period of time under consideration. During this period of time the individual receives money income of an amount represented by OA and, in order to consume a unit of X, must pay the price represented by OA/OA', the slope of AA'. Given these conditions, he is assumed to adjust his money expenditures on X so as to achieve maximum satisfaction, as represented in the diagram by the point P. AA', then, represents the two constraints under which the individual is assumed to maximize the satisfaction obtained from the consumption of X and M (which may be taken to represent all other commodities in this context); namely, the price of X and the amount of money income at his disposal.

A commodity tax is now assumed to be imposed upon X, thereby leading to an increase in the price of X. On the assumption that the imposition of the tax does not change the individual's money income, OA, AA'' is then the new price-income line and Q the position of maximum satisfaction. At this point the individual buys AR of X, paying RQ for it, the amount of money represented by SQ being the tax yield to the government on the amount of sales AR. If, instead of the commodity tax, an income tax yield-

[1] The authors are indebted to Professors J. S. Bain, M. M. Davisson, and H. S. Ellis for criticisms of an earlier draft of this paper.

[2] See, e.g., M. F. W. Joseph, "The Excess Burden of Indirect Taxation," *Review of Economic Studies*, VI, No. 3 (June, 1939), 226–31; M. W. Reder, "Welfare Economics and Rationing," *Quarterly Journal of Economics*, LVII, No. 1 (November, 1942), 154; George J. Stigler, *The Theory of Price* (New York, 1946), pp. 81–82; J. R. Hicks, *Value and Capital* (Oxford, 1939), p. 41; H. P. Wald, "The Classical Indictment of Indirect Taxation," *Quarterly Journal of Economics*, LIX, No. 4 (August, 1945), 577–96. These writers have dealt with one commodity and one consumer; Harold Hotelling has generalized the argument to the case of n commodities and one consumer in the article, "The General Welfare in Relation to Problems of Taxation and of Railway and Utility Rates," *Econometrica*, VI, No. 3 (July, 1938), 242–69. The whole argument, of course, goes back to Dupuit's writings of the mid-nineteenth century and to Marshall's concept of consumer surplus (see Jules Dupuit, "De l'utilité et de sa mesure," écrits choisis et republiés par Mario de Bernardi, *La Riforma sociale* [Turin, 1933], and Alfred Marshall, *Principles of Economics* [8th ed.; London, 1930], p. 467). For a recent synthesis of the various refinements of the consumer surplus concept based upon indifference analysis see James N. Morgan, "The Measurement of Gains and Losses," *Quarterly Journal of Economics*, LXII, No. 2 (February, 1948), 287–308, and Paul A. Samuelson, *Foundations of Economic Analysis* (Cambridge, 1947), pp. 202–53.

ing SQ is imposed upon the individual (regardless of the amount of X he chooses to buy), the resulting price-income situation may be represented by BB', which passes through Q and is parallel to AA' (on the argument that the price of X is unaffected by the income tax, but the individual's income is reduced by an amount $AB = SQ$).

Given that the indifference curves are convex to the origin, BB' will cut I_2 at Q and again at Q'; between these two points it will lie on higher indifference surfaces than I_2. Hence it may be argued that under the income tax the consumer will move to the point of highest satisfaction on BB', where he will be better off than under the commodity tax without reducing the yield of the tax. As a corollary, it follows that an income tax which leaves the consumer on the same indifference curve as a commodity tax will yield a greater amount of revenue to the government (AC as compared with AB).

This argument, as well as the Hotelling variation, involves two important and somewhat vulnerable assumptions. In the first place, it assumes that a person is made worse off in real terms by either an income tax or a commodity tax. For example, a person's satisfaction is supposedly decreased as a result of a tax by an amount indicated by the difference between indifference curves I_1 and I_2 (Fig. 1). This assumption can be shown to be false if generalized to an economy as a whole. In other words, income taxes or commodity taxes do not necessarily make consumers in general worse off. Second, the conventional argument implicitly or explicitly assumes that, in the absence of taxation, resource allocation is ideal. But, as will be pointed out in the following remarks, if resource allocation is not ideal, commodity taxes may improve as well as worsen it.

Both the conventional argument and the present criticism require the postulate that the concept of ideal resource allocation can be given definitive meaning. Otherwise one allocation is as good as any other, and no judgment can be made concerning the welfare consequences of the reallocation occasioned by a tax.

II

The view that taxes make people worse off is convincing at first glance.

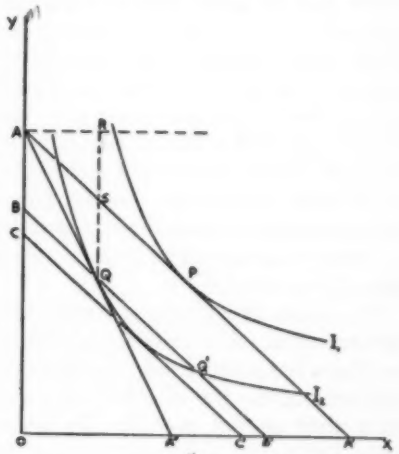


FIG. 1

Most taxpayers undoubtedly consider it to be an obvious and sound proposition. To a particular person, an income tax appears to impoverish him when he considers the benefits he might reap by spending the money which he is required to pay to the government as taxes. The benefits which might be supposed to result from tax reduction, however, need not in fact result if taxes are generally reduced. The initial effect of a general reduction in taxes, such as provided in the Revenue Act of 1948, is to increase money incomes after taxes, which in turn

leads to some increase in expenditure on output. If the economy is at or near full employment, the result is higher prices (or more rationing by nonprice methods) without any increase in output attributable to the tax reduction.

The economic arguments offered against tax reduction under conditions of full employment have been based, not upon the contention that the public should be forced to impair its real living standards (as a result of high taxes), but rather upon the view that lower taxes would lead to higher prices, impair the most efficient utilization of resources, and likely reduce rather than increase the standard of living of the low-income groups. During the war it was especially evident that higher taxes would not have impaired living standards; rather they would have reduced the need for financing governmental activities by borrowing or money creation on as large a scale as actually occurred.[3]

The costs of government arise from governmental use of resources, as Professor Pigou has pointed out.[4] To the extent that resources are directed to public ends, they are not available for private ends. Ordinarily the state acquires the use of particular resources by making money expenditures which may be financed by means of taxation, or by borrowing with or without money creation. Hence taxes need not represent the costs of government. This is not to say that it is immaterial which method of financing government expenditures is in fact chosen. Presumably that method is best which encourages, or at least interferes least with, the most efficient use of the resources left over for the private sector of the economy.[5] Thus it is seen that a reduction in taxes *may*, by leading to a system of financing which is less efficient in the above sense, actually reduce private real living standards, and an increase in taxation may do the opposite for analogous reasons. In other words, there is no a priori presumption that an increase in taxes will lower real living standards.

Applied to the issue in question, the conclusion that an income tax on an individual worsens his real position as indicated by the lower indifference curve I_2 (Fig. 1) is not generally valid. The person may even be on a higher indifference curve after the tax, provided his competitors (i.e., other consumers) are taxed more heavily. No presumption exists therefore that a person is worse off merely because of the tax.

This conclusion does not undermine the allegation that excise taxes involve an excess burden. Obviously, taxes may alter resource-product allocation. The essence of the excess-burden contention is that the tax-induced reallocation is always inferior from the consumer's point of view. This feature of the doctrine may now be examined.

To show the possible allocating effects of excise taxes, it is convenient to center attention at first on an economy producing only two commodities. Such a case is depicted graphically in Figure 2. Quantities of commodity X are shown along the horizontal axis and of commodity Y along the vertical axis. CP represents the combinations of X and Y which can be produced with the resources available to the economy in question. The production of any combination of X and Y which corresponds to a point on the *compound-*

[3] Cf. William Fellner, *A Treatise on War Inflation* (Berkeley, 1942), pp. 5–6.

[4] A. C. Pigou, *A Study in Public Finance* (3d rev. ed.; London, 1947), pp. 19–23.

[5] The most efficient use may be taken to mean not only the maximum output but also the optimum system, in some ethical sense, of resource-product allocation.

production curve CP[6] entails full employment of these resources. CP is drawn concave to the origin on the assumption that there is some specialization of resources to the production of each commodity and that constant physical returns to scale prevail.

Let GH be a price-expenditure line, namely,

$$M = XP_x + YP_y,$$

where M is the amount of money consumers are prepared to spend,[7] and P_x and P_y are the prices of X and Y. A position of tangency to the compound-production curve CP is arbitrarily obtained by assuming that, for any given value of M, the absolute prices of X and Y adjust to give such a position.

The indifference curves I_1, I_2, I_3, and I_4 have a special meaning. They are aggregates of the indifference curves of each consumer. This procedure is meaningful provided each consumer has the same tastes. This special assumption is made at this point to avoid interpersonal comparisons and will be dropped later in the argument.[8] Our argument also assumes that each consumer has the same amount of money to spend—an assumption which likewise will be dropped later.

The point of tangency, L (Fig. 2), of the highest indifference curve with CP indicates maximum consumer welfare, since I_3 is the highest indifference curve consistent with the full employment of resources. In a price system, L is also an equilibrium point, provided the prices of X and Y and the quantity of money, M, give a price-expenditure line tangent to

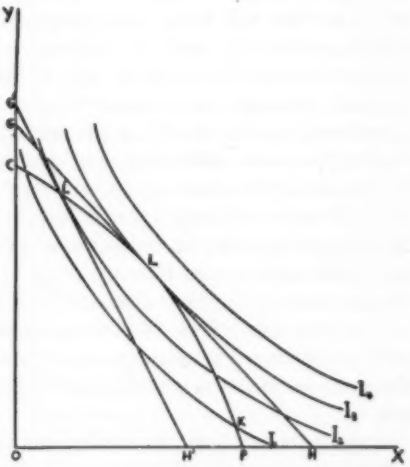


FIG. 2

both I_3 and CP. This means (1) that consumers can spend all the money they wish on X and Y (i.e., no nonprice rationing of purchases) and (2) that the quantities of X and Y produced are all taken (i.e., no nonprice rationing of sales). A further condition of equilibrium is that a unit of each kind of resource used to produce X and Y obtains the same money net income in each use, for, if this is not the case, there is an incentive to produce more of one commodity and less of the other.[9] Thus, if all these conditions are

[6] Cf. J. A. Nordin, "The Marginal Cost Controversy: A Reply," *Economica*, XIV, No. 54 (May, 1947), 134–49, which describes such a curve as a transformation curve. Transformation, however, suggests the transforming of resource-services into products (cf. Hicks, *op. cit.*, pp. 79–81). *Compound-production* curve seems a more descriptive label, since the curve shows possible combinations of products which can be produced from given resources. The point, however, is a minor one.

[7] It is customarily assumed that M is money income. This seems wrong if income means simultaneous accruals, because there must, in actual institutional settings, be some lag in time between money receipts and the expenditure of *that* money, i.e., velocity cannot be infinite. M is objectively determined by a person's cashable asset position and typically will be closely associated with that portion of a person's assets provided by the income of the preceding period.

[8] The reader may be reminded that the "excess burden" argument has generally been stated so as to avoid interpersonal comparisons.

[9] For human resources differences in the attendant psychological aspects of work permit persistent

satisfied, the point L gives not only the maximum welfare position for consumers but also the equilibrium conditions for a price-money system in the sense that each resource owner has reached his best income position and that prices clear all markets with full employment.

Suppose first that an income tax is levied equally against the income of all persons. The tax reduces M in subsequent periods unless offset by some compensating financial device.[10] Thus at the same prices for X and Y the price-expenditure line GH falls. Unemployment results unless P_x and P_y fall by an amount sufficient to restore GH to its original position. In a competitive environment, prices would do all the adjusting and no unemployment would emerge. It follows that consumers would be in the same real position as before, because there has been no reduction in output. Although money incomes after deducting taxes fall, prices also fall. Unless an income tax affects the compound-production curve, consumers are left at the same satisfaction levels as before the tax.

Suppose now that an excise tax is placed on commodity X accompanied by reductions in the rates of the income tax so that the two taxes together give an unchanged yield. The total income effect by assumption is zero, since the yield of the excise tax replaces the yield of the income tax. Resource owners have an incentive to produce less of commodity X and more of Y in order to equate income per unit of resources at the margin. This reallocation raises the price of X relative to the price of Y, as indicated by the new price-expenditure line $G'H'$. The point L' gives the only result consistent with the conditions that all resources are fully employed (i.e., any solution must fall on the compound-production curve) and that there is no rationing by methods other than price (i.e., L' must be at the point of tangency of the price-expenditure line $G'H'$ with the highest indifference curve touching $G'H'$). Obviously, however, L' is on a lower indifference curve than L, and there is an excess burden in this case, indicated by the difference between I_2 and I_3. This conclusion is consistent with the "excess-burden" argument.

This argument, however, is not general. It holds rigorously only if L is a point of maximum welfare. If the original position were some point K on CP, a tax on X would have put consumers on higher indifference curves as long as the production of X was reduced and Y increased thereby to the quantities indicated by L or L'. The "excess-burden" contention rests, in other words, on an empirical assumption, namely, *that the relative quantities of various commodities produced are ideal in the absence of excise taxes*. If this is not true, there is no a priori reason for supposing that excise taxes must make consumers worse off. Furthermore, as a logical argument it does not follow that excise taxes need diminish welfare, even if allocation is already ideal. For any given tax placed on X there is a tax on Y which would leave the price-expenditure line GH in the same position. There need be no reallocation of resources if both commodities are taxed in such a way as to leave unchanged the relative net earnings of the same kind of resources in each use. In the simple case

differences in the money income obtained. Optimum allocation from the point of view of resource owners should, strictly speaking, be stated in terms of equating net advantages at the margin as Marshall has pointed out (*op. cit.*, pp. 73, 557).

[10] Government may compensate for higher taxes by (1) increased output expenditures, (2) increased transfer payments, and (3), under special conditions, sale of debt. Individuals may compensate by dishoarding or, with the connivance of the banking system, by increasing the money supply.

here under consideration, a uniform *ad valorem* tax would have such a result.[11]

In any actual system there is no presumption that in the absence of excise taxes resources are so allocated as to maximize living standards. Given resource mobility, if Y is sold at a monopolistic price and X at a competitive price, a tax on X would improve allocation. More generally, in an economy with many products and in which economic welfare is not maximized (i.e., any actual system), taxes upon production may move allocation toward or away from the ideal. In the absence of knowledge concerning the character of the actual allocation, no a priori judgment can be made as to whether a particular excise tax occasions an "excess burden" or an "excess gain."

III

The foregoing argument has avoided defining ideal allocation when the satisfaction of any one consumer cannot properly be taken as a perfect sample of aggregate welfare. Excise taxes are almost certain, even apart from their money income effects, to worsen standards of some consumers and to improve those of others. A tax levied on commodity X injures those who consume relatively more of X and benefits those who consume relatively more of Y.

One currently popular method for treating the problem of group welfare is to define a position of maximum welfare for society as a whole as one in which no individual can be made better off while leaving *all* other individuals at constant satisfaction levels.[12] Literally interpreted, this definition would rarely have any application. A tax which reallocates resources at all is almost certain to decrease the satisfaction of some persons. To avoid this limitation, the advocates of this view suggest the use of compensating devices in the form of taxes and subsidies. Those consumers injured by a reallocation are to be subsidized until they are no worse off than before. Those initially benefited are to be taxed to provide the subsidy to those injured. After those initially worsened are fully compensated, if there is something left over so that some persons remain at higher satisfaction levels whereas everyone else has been returned to a constant level, the reorganization in question has provided an increase in welfare. Maximum welfare exists only when no such reorganization is possible.

This method of handling welfare problems involving groups of individuals with different tastes and incomes does not permit any ready answer to the question of whether a particular excise tax gives rise to an excess burden or to an excess gain. If a position of maximum welfare is assumed in the sense that no reorganization of the type mentioned above is possible, any further reorganization would by definition result in a decrease in welfare. If one adopts the more likely assumption of an initial allocation of resources which is less than ideal, this approach to welfare problems does not tell us a priori in which direction the imposition of a commodity tax is likely to change the allocation. There is no presumption in favor of a movement in either (or no) direction—

[11] A similar observation has been made by Ragnar Frisch in his criticism of Hotelling's apparently contrary view that excise taxes necessarily worsen allocation (cf. "The Dupuit Taxation Theorem," *Econometrica*, VII [April, 1939], 145–50, and "A Further Note on the Dupuit Taxation Theorem," in the same issue, pp. 156–57).

[12] Cf. N. Kaldor, "Welfare Propositions in Economics and Interpersonal Comparisons of Utility," *Economic Journal*, XLIX (September, 1939), 549–52; J. R. Hicks, "The Foundations of Welfare Economics," *Economic Journal*, XLIX (December, 1939), 696–712; Oscar Lange, "The Foundations of Welfare Economics," *Econometrica*, X, Nos. 3 and 4 (July–October, 1942), 215–28; and Samuelson, *op. cit.*, pp. 202–53.

a conclusion which follows by analogy to the more simplified conditions considered in Section II above.

The approach under consideration does provide an experimental technique for assessing the effects of resource reallocation occasioned by a tax. The presence of an excise tax effects a transfer of money income from certain resource owners to the government[13] and a change in the composition of output so that some consumers are better off, others worse. If at the same time the resource owners who transfer money to the government under the new commodity tax are exactly compensated, say, by a reduction in their income taxes, then all money incomes, including that of the government, will be the same as before. So far no net change in money position has been brought about for any group or person. Nevertheless, three groups may be distinguished: (A) those who are better off in real terms, i.e., move to higher indifference schedules; (B) those worse off; and (C) those left in the same position.

To determine whether an excise tax changes welfare, we must now effect, by positive and negative taxes, a transfer of money income from Group A to Group B until the latter have been moved into Group C. This procedure will, of course, entail a further change in relative prices and resource-product allocation because of the pressure of new demands which have now become effective, and the reduction in effectiveness of old demands. Finally, we must assess the resultant welfare position of all those initially in Group A. Presumably we have allowed none of them to be transferred to Group B, the decrease in their money incomes being stopped as soon as they move into Group C. Hence, if any individuals still remain in Group A, the commodity tax has provided an "excess-gain," i.e., an increase in welfare. On the other hand, if all those originally in Group A have been moved into Group C *before* all those in Group B have been transferred to C, the tax results in an excess burden, i.e., a decrease in welfare.

There are severe practical difficulties in the application of this concept of welfare. Compensating taxes and subsidies must be tailored to each person affected by the allocating device under consideration. Objective standards must be devised to determine when a person is restored to the same satisfaction level as before. Furthermore, the approach has little relevance when the government desires to alter its total tax yield. Other welfare approaches may therefore be sought.

One such approach commonly used in economic thinking is to let money expenditures measure welfare, i.e., the adoption of what has been called "dollar democracy."[14] Such propositions that resources are ideally allocated when the price of each product is equal to its marginal money cost, or proportional to its marginal money cost, or equal to marginal social cost illustrate the assumption that each dollar counts as one vote for welfare purposes.[15] All these propositions

[13] The income effects of excise taxes are one of the more difficult and controversial features of tax theory. For a fuller discussion of the point see E. R. Rolph, "The Burden of Import Duties with Fixed Exchange Rates," *American Economic Review*, XXXVII (September, 1947), 604–32.

[14] Nordin, *op. cit.*, pp. 147–48.

[15] A. P. Lerner argues in favor of the condition that price equals marginal cost on the grounds that otherwise workers are forced to take more or less leisure than they should (cf. his *Economics of Control* [New York, 1944], pp. 102–4). In this view, he is supported by R. H. Coase, "The Marginal Cost Controversy: Some Further Comments," *Economica*, XIV, No. 54 (May, 1947), 152, and by Samuelson, *op. cit.*, p. 240. Hotelling, after initially taking the same view, finally adopts the proportionality view as a result of Frisch's criticisms, stating: "It is enough that all prices be *proportional* to marginal

define maximum welfare in terms of prices alone. Hence it is assumed that products and resources are allocated only by prices and that consumer satisfaction is obtained by the expenditure of dollars. Each dollar, then, regardless of who possesses it, represents an equal claim to the output of the society, and from this fact is derived the expression "dollar democracy."

It may be noted, however, that if the "dollar-democracy" rule is accepted as a welfare guide, it does not follow that excise taxes necessarily misallocate resources. In any money-price system in which prices are neither equal nor proportional to money marginal costs, an excise tax may either worsen or improve allocation in this special sense. For the reasons set forth in the last section, an excise tax necessarily worsens allocation only when the allocation is already ideal, and only in this circumstance if the tax is neither general nor proportional to prices, as Hotelling has admitted.[16] A particular excise tax on commodities the prices of which are too low (i.e., quantities produced too large) relative to others could improve allocation. Thus a tax may give rise to an excess gain, and consumers are made better off.

But the welfare concept of dollar democracy is difficult to defend, given the wealth-ownership dispersion in actual systems. Although much of the contemporary thought on welfare problems avoids interpersonal comparisons, meaningful policy judgments concerning taxes are very difficult unless such comparisons are made. We shall postulate the ethical principle that the best system of allocation is one which treats every consumer alike. In a price-money system this is interpreted to mean that (1) each person has the same amount of money to spend, i.e., voting power is equal, and (2) resources are so allocated that quantities produced sell at prices equal to their marginal social costs. The principle that each person should, ideally, have the same vote with regard to his share of the output can be defended on the same ethical principles used to defend political democracy. Negatively, it abhors the doctrine of an élite class. Government action designed to achieve less inequality in wealth ownership involves either (1) taxing the income (or wealth) of the rich and subsidizing the poor or (2) reducing effective voting power of the dollars of the rich as compared with the dollars of the poor. Excise taxes are particularly relevant to the accomplishment of the second objective. If items produced for the rich are taxed heavily, resources are made available to produce more output for the poor. In the absence of nonprice rationing, the effectiveness of such taxes depends upon the extent to which the rich consume things which the poor do not.[17] Although excise taxes, therefore,

costs" ("The Relation of Prices to Marginal Costs in an Optimum System," *Econometrica*, VII [April, 1939], 151). If leisure is thought of as a product, the proportionality theorem holds provided the "price" of leisure is proportional to its marginal cost. In fact, it is administratively difficult to impose any taxes which would give this result but not much more difficult than in the case of many other implicitly priced products such as home-grown vegetables. The meaning of optimum pricing should be distinguished from the empirical methods of assuring optimum pricing. Optimum pricing refers to price relations among products only, and the prices of instrumental services are not directly relevant to the definition of the concept. Pigou, of course, holds to the condition of equality of price to marginal social cost (*Economics of Welfare* [4th ed.], pp. 151–81). This position is formally accurate, since social cost refers to to the value of foregone output (including leisure) and is consistent with the proportionality theorem.

[16] See n. 15 above.

[17] Taxing "luxuries" would not satisfy this condition unless luxuries are defined to mean only those items which the rich consume and the poor do not. Commonly the notion of a luxury carries a

can directly reduce some of the inequalities in command over resources, the income effects of such taxes may work in the reverse manner. Thus a heavy tax on high-quality fur coats has some income-reducing effect on those engaging in their production, and if these groups are poor, as many in fact are,[18] they are placed at a further disadvantage as compared with other groups in the population. The cases in which excise taxes, therefore, can be justified with respect to both their allocation and income effects are not likely to be numerous.

IV

The previous comments, if correct, rob formal theory of another certainty. It is improper to suppose that excise taxes necessarily result in an excess burden. The demonstration of the excess burden argument is based on the assumption that the reduction in output of the taxed commodity is not compensated at all by an increase in the output of other commodities, and hence consumers must be worse off. Such an approach implies that the released resources disappear from the economic scene. To answer the question as to whether a particular tax changes living standards, it is at least necessary to take account of gains in the output of nontaxed items occasioned by the reorganization of resources. When the task is viewed in this manner, it is almost self-evident that excise taxes may improve as well as worsen living standards.

It does not follow that excise taxes are desirable revenue devices. Obviously, even judged on allocation grounds alone, such taxes may aggravate the problem of resource allocation and provide the public with an inferior selection of products. Conclusions concerning this point require close study of the particular commodity taxes as one aspect of a tax system, an examination of the likely character of the induced allocation, and the status of those likely to be injured in real terms. A further and important consideration is the income effect of such taxes. In the preoccupation with the relation of excise taxes to resource allocation, it is easy to overlook the effects of such taxes on the pattern of money income. As compared with taxes which directly employ a means test, such as personal net income and inheritance taxes, excise taxes are not likely to be effective in reducing inequality in economic status and may in many cases lead to yet greater inequality.

Policy judgments concerning particular taxes involve, in addition to a consideration of allocation effects, investigations concerning the induced income effects and their equity, the subsequent consumption and investment expenditure effects flowing from reduced private net incomes, and, in this connection, the stabilizing or destabilizing effects of taxes ("built-in flexibility") on total expenditures over time. The allocation aspect is particularly important in the case of a commodity tax and may be the determining factor in policy judgments. Import duties illustrate such a case. As a general rule, however, all these questions must be considered in a judicious evaluation of particular taxes.

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moralistic flavor, referring to items which poor people do consume but which others think they should not (cf. Henry Simons, *Personal Income Taxation* [Chicago, 1939], p. 39).

[18] Cf. Division of Tax Research, Treasury Department, *Federal Retail Excise Taxes* (October, 1947), pp. 2, 4.

ROSTOW'S PROPOSALS FOR PETROLEUM POLICY

JOE S. BAIN

IN HIS recent work, *A National Policy for the Oil Industry*,[1] Professor Eugene Rostow proposes some significant changes in the American policy toward the petroleum industry. His well-reasoned and thoroughly documented argument takes full advantage of much of the literature on petroleum economics and of earlier policy studies like those by Ise, Stocking, and Watkins. It brings to bear on the contemporary policy issue not only a thorough training in law but also a study of the most pertinent economic analysis. Because oil policy is now getting considerable attention in this country, and with a hit-or-miss expediency generally serving in lieu of fundamental long-run measures, Rostow's analysis of the policy problem should be carefully considered by students of economic policy. Certain of Rostow's proposals, however, are controversial in character. With a slight alteration in analysis or in the evaluation of evidence, he might have emerged with somewhat modified policy proposals on at least two points. This note will review his general argument and then examine the area of controversy within which certain of his proposals fall.

After a synopsis of the history, current organization, and past regulation of the American petroleum industry, the author is mainly concerned with two policy issues: (1) the control of crude-oil production by public authority and (2) the regulation of market structure and competition in the transportation, refining, and marketing of petroleum and its products. In the area of crude-oil production his main concern is appropriately with conservation. As he recognizes, the concept of petroleum conservation is not simply, or of necessity primarily, one of the time pattern of use of a given quantity of oil stored under the ground. This idea is involved, but at least equally important is the aggregate amount of oil to be recovered in all future time by economical methods or within a given limit of cost—more precisely, the relation of the aggregate recovery to the aggregate cost of recovery. With given petroleum reserves, various alternative time patterns of use are available. But, also, the aggregate amount to be recovered and its relation to cost will vary (1) with the character of exploitative drilling of each oil pool—especially with whether it is under a unit control or is competitive; (2) with the corresponding pattern of production as among various wells drawing on a pool—whether unit-controlled or competitive; and (3) with the time pattern of production from the well and from the pool as a whole, which may of course be considerably influenced by whether drilling and production are unitized or competitive. In the American petroleum industry we have suffered both from what was apparently an excessively rapid use of available oil and from the fact that our production practices and output rates have seriously lessened the aggregate amount of oil recoverable at reasonable cost. Both deviations from good conservation results are chargeable, at least in large part, to the competitive drilling and production of most oil fields by antagonistic ownership interests operating under the traditional rule of capture. With intrafield rivalry to get the oil out running rampant, drilling and production costs are excessive, the over-all technique of production is uneconomic, and the interwell pattern and the time pattern of production are such as greatly to reduce ultimate recovery.

There is no serious question about these facts as Rostow represents them. Nor would many disagree with him when he holds that the curtailment and proration programs

[1] New Haven: Yale University Press, 1948. Pp. xvi+173.

sponsored by the federal and state governments since the early 1930's fall far short of a full remedy for the situation. These programs essentially accept the status quo of antagonistic ownership, drilling, and production within the individual oil field and attempt to overcome the inherent tendencies toward uneconomical rates and patterns of production by assigning production quotas limiting output. They are unsatisfactory because competitive drilling is not eliminated—so that too many (and poorly placed) wells demand quotas; because "equity" rather than basic conservation considerations dominate the allocation of quotas among wells; and because the rate of over-all curtailment of production has seemed to turn more on price stabilization than on true conservation. Thus any resulting improvement in the conservation of oil, at least in the direction of enhancing ultimate yield, is much less than could be accomplished if it were insisted that intrafield rivalry in exploitation be completely eliminated and that each field be operated as a single technical and administrative unit.

It is on the basis of this quite valid analysis that Rostow lends his support to the familiar and convincing case for compulsory unitization in crude-oil production. The ownership interests on each field should be required to combine to exploit the pool as a single technical unit, thus eliminating all the destructive tendencies inherent in competitive drilling, competitive withdrawal of oil, and (under proration) competition for quotas. From this reform alone we should certainly tend to get a greater aggregate improvement in conservation than from all the curtailment-proration regulation we have had to date. Few impartial students of petroleum policy would object to Rostow's strong advocacy of compulsory unitization. Having reached this point, however, he takes a further step which is less obvious. Given compulsory field-by-field unitization, he proposes complete abandonment of compulsory curtailment of output and would rely entirely upon active and unregulated competition among the various unitized fields. The bases of this suggestion deserve a careful examination.

Acceptable conservation results in the petroleum economy presumably involve (1) a time pattern of output which does not exhaust the available supply so rapidly as to result in an early shortage or unduly high cost of fuels to burn in internal combustion engines, furnaces, boilers, etc., and (2) a relation of aggregate recovery to aggregate cost which approximates the social optimum. The essential issues involved in Rostow's proposal are thus (1) what sort of time pattern of output and what aggregate recovery we would get with unitized but uncurtailed production and (2) whether any substantial improvement could be had by adding curtailment to unitization. A connected but not strictly essential issue concerns just how much good curtailment has done without unitization.

The market organization upon which Rostow would depend for socially satisfactory petroleum production would involve (1) free, unrestrained, and, as far as possible, perfect competition among a large number of separate fields and (2) monopolistic or unitized operation and control of each individual field.[2] Compared to the present situation, intrafield competition would be eliminated and interfield competition increased, the latter mainly by removal of

[2] Each field would thus be placed under a single administration, presumably with participation in earnings and in control by pre-existing ownership interests; but it is evidently contemplated that the managements of the several fields should be required to be strictly independent of each other. Disintegration and dispersion of the major oil companies (to be discussed below) would evidently be relied upon to overcome the problem of a single ownership interest co-ordinating the unit managements of competing fields. If this plan were made effective, the number of management groups controlling crude-oil production would be greatly reduced, but it would still be significantly large. The size distribution of producing units—depending, then, upon the relative sizes of fields rather than upon the relative size of major and other oil companies as at present—would presumably manifest somewhat less concentration than at present and, although implying some oligopolistic interdependence of sellers, would be potentially consistent with fairly active price competition. Rostow has not analyzed this matter from a statistical standpoint.

curtailment. Theoretically, the amount and pattern of production should then tend to change in the following manner. First, the number of wells drilled and operated on any field should be reduced, and those operated should be better placed from an engineering standpoint; this would save costs and enhance ultimate recovery per se. Second, the cost and revenue calculations controlling production from any well and from the whole field should be altered. Whereas, with intrafield competition, each well operator would seek (*ex* curtailment) to equate short-run marginal cost for the well to current marginal revenue (largely neglecting the effect of his current withdrawals on the future revenue of *the field*), a unitized administration would equate marginal cost for the field to current marginal revenue for the field minus the discounted present value of any decrements to future net revenue resulting from current output extensions. In effect, the unitized operator would devise a rational time plan of production for the field, whereas the competitive well operator, under the rule of capture, would largely neglect the effect of present field output on future field output as outside his individual control. A similar difference in cost-revenue calculations would affect drilling, where long-run marginal costs are balanced against marginal revenue. The general tendency of unitization would evidently be to reduce unit costs and the rate of withdrawal from most fields, according to a rationale which took full account (from the standpoint of profits) of the effect of current on future field output. Hence we might expect an enhancement of aggregate recovery and also some extension of the time period over which oil would be withdrawn. Market-wise, however, there would be no organized restriction of output; and the marginal revenues (present or future) to which the many unit fields adjusted should, in Rostow's view, correspond closely to the going or expected market prices of the various time intervals.[3]

[3] The possible effects of oligopolistic interdependence among unit fields might require some amendment to this argument.

There is little question but that aggregate recovery and the time pattern of production under the suggested system would be superior to those attainable with nonunitized production either without or with curtailment. The crucial question, however, is whether the results with unitization would be sufficiently ideal that no further curtailment would be required. Rostow asserts that they would and largely rests his case on the following observations. First, as regards the aggregate recovery and its relation to cost, he seems to assume that the profit-maximizing interest of producers and the welfare-maximizing interests of consumers are identical under unitization. This assumption is a precarious one for a variety of reasons which cannot be fully explored here. It may be pertinent to suggest, however, that any differences between producers and the general public with regard to time horizons, time preferences, risk rates, and expectations will give rise to systematic and potentially very important differences between the private and the social optimum production pattern and aggregate recovery. Rostow does not consider this problem but relies on the observation that the petroleum industry offers no problems in this regard not encountered with coal, iron ore, copper, and lumber. It would seem that the history of American lumbering (even with "unit" tracts) might lead one to distrust private-profit motives as a guide to socially optimum production. Simply in order to approach more closely an optimum aggregate recovery, a priority would appear desirable for the government to retain some curtailment powers even after over-all unitization.

There is also the question of how rapidly it is wise to use up the limited amount of oil in the ground and of whether unregulated but unitized production would not withdraw oil too rapidly—the problem of the time pattern per se. Here again there is no necessary coincidence between the private and the social interest. Rostow holds, however, that there is no serious issue, since the future supply of petroleum and other liquid fuels will continue to be plentiful and cheap even if we use our oil at something like the cur-

rent rate or at an uncurtailed rate once fields are unitized. This position is unquestionably optimistic and no stronger than a contrary and more pessimistic view. More weight might be given to the poor oil-discovery record in this country during the past decade and to various engineering calculations of liquid-fuel costs from alternative sources. Upon the basis of available evidence, it might seem prudent to curtail current production somewhat, to adopt measures designed to reduce the supply of petroleum available for low-valued uses (fuel oil, for example), and to divert a larger proportion of any given output into high-valued uses.

Rostow's stand on curtailment may stem more from a general distrust of the policy as one of monopolistic market stabilization than from a consideration of its appropriate use in a revised situation. He suspects any defense of it as a plea for vested producing interests. But though much of his suspicion may find grounds in the past performance of curtailment, it does not necessarily follow that an improved federal curtailment program would be useless or undesirable.[4] And if curtailment results in excessive profits, means are available for recovering these by taxation of various sorts.

The second major portion of Rostow's book is concerned with market structure and competitive behavior in pipe-line transportation, refining, and marketing. He first appropriately emphasizes the strategic role in market control of the ownership by a few major companies of most of the trunk pipeline mileage and points to the inefficacy of attempts to regulate the carrier status and rates of these lines. He then examines concentration in the refinery field and concludes from various available evidence that "large-scale" refining is not essential to efficiency. Finally, he reviews the restrictive and collusive practices commonly found in gasoline marketing, concluding (it would seem correctly) that past antitrust suits have not provided effective remedies against the monopolistic tendencies in this sphere.

From this analysis Rostow develops his further proposals for public policy. A basic suggestion drawn from the crude-oil analysis is that there should be a federal statute requiring unit operation of each field, according to high geological standards, and abandonment of any curtailment program. In addition, he would require (in the same statute) divorcement of crude production from other divisions of the industry and especially from transportation. Such disintegration is held necessary if the competition among unitized fields is to be an effective regulator, since otherwise the major companies might impose monopolistic curtailment programs of their own. At the same time, a suit should be instituted under the Sherman Act to secure (1) disintegration and (2) considerable horizontal dispersion of the major oil companies. (Rostow argues at length that the recent Aluminum and Tobacco decisions may have sufficiently broadened the scope of the act to give such an action great hope of success.) The requisite of the reorganization plan to be secured, as a final remedy in a civil suit, is that no segment of the market structure should remain controlled by a "few" large units, for either buying or selling. In addition, no major company should be integrated through two or more of the four principal divisions of the petroleum industry.

Although divorcement and "trust-busting" proposals for the oil industry are not new, Rostow's prescription (aside from unitization and curtailment) is obviously very strong medicine. I shall not argue here concerning how far the court might go in indorsing a plan for disintegration and dispersion of major oil companies, but there could be some doubt that it would agree to so drastic a remedy. Regardless of the political and legal feasibility of Rostow's proposals, however, their economic aspect deserves examination. Rostow presents us with a hypothetical alternative to the present organization of the oil industry. Currently the

[4] It may be noted that Rostow and I have some outstanding differences on the merits of curtailment or unitization, as in this country since 1930; but they are hardly essential to this discussion.

industry is dominated by an oligopoly of "twenty majors," which together own about 80 per cent of refinery capacity, 90 per cent of crude-oil transport facilities, and 50 per cent of crude-oil output[5] and which own or substantially control a large fraction of marketing capacity. Major-company control of transport plus curtailment effectively dampen any latent tendency toward the working of competition in the selling or buying of crude oil, so that price and output in all stages of the industry are affected in similar degree by the policies of a distinct oligopoly of large integrated firms. Within each of three or four geographically distinct submarkets, moreover, the degree of concentration is higher than the national figures indicate, with from five to ten majors controlling four-fifths or more of any such market. Rostow's alternative to this situation would find a fairly large number of unitized fields, none integrated with a refiner, selling crude to an increased number of nonintegrated refiners (with transport facilities equally available to all comers), which in turn would sell their output to very many nonintegrated marketers for distribution. The main economic issues raised by his proposal (aside from the conservation question, already discussed) concern how the new situation would affect (1) efficiency (and thus cost) and (2) competition, pricing, and the relation of price to cost.

Rostow evidently feels that the *disintegration* involved would entail no significant real diseconomies, and in this I am inclined to agree with him. Integration is unquestionably advantageous to the major companies but not visibly in terms of real production costs. For the rest, he would rely on the operation of a freely (and to some approximation purely) competitive pricing mechanism in three successive markets (crude, refinery gate, and final distributive) as certain to yield socially more desirable price results than we get from the suspectedly concerted price policies of the present oligopoly of major integrated firms. Furthermore, he would hold that the requisite market structure could be had without significant diseconomies due to the reduced horizontal scale of the individual firm.

The issue thus raised may be divided into two parts: (1) Is something like a purely competitive market structure at each stage of the industry consistent with efficient production? (2) Would a succession of separate markets, each dispersed as far as economy permits, be likely to yield better price results? Presuming that transport rates could be effectively regulated, the first question is serious only with respect to refining. Efficient crude production requires a unit no larger than the field, and there would be a fairly large number of these under unitization; marketing could be efficiently conducted within a relatively atomistic market structure. But, in the case of refining, it is not entirely clear that the economies of scale would permit an enlargement of numbers sufficient to change the oligopolistic nature of the industry.[6]

Although there is conflicting evidence on the economies of scale in refining, the most convincing data suggest that rather large refineries—of sixty thousand or more barrels daily input capacity—are needed for maximum efficiency. If this is so, most large refinery firms could be broken without significant diseconomy into two or three or more parts, each retaining an efficient size of plant of from fifty thousand to one hundred thousand barrels capacity. We thus might have sixty or more principal refinery firms (the number depending on the rate of consumption) in place of the present twenty majors, or fifteen to twenty or more within the important regional submarkets. If intensive rivalry developed, small independent refiners now forming a competitive fringe on the industry might be reduced in numbers.

[5] The corresponding percentages for the five largest firms are about 40, 60, and 25.

[6] With respect both to refining and to crude production and exploratory technique, there is potentially the added issue of how dispersion of large firms would affect research and technological progress. Such effects should be considered, although available empirical evidence and a priori indications do not suggest any very definite conclusions on the matter.

In any of the regional markets which constitutes a natural focus for price-determining forces, therefore, the economical alternative is between (1) the present market structure of a concentrated oligopoly core of five to ten firms controlling 80 to 85 per cent of the market, plus a competitive fringe of independents, and (2) a less concentrated oligopoly of from fifteen to twenty-five firms of similar size, and perhaps a smaller competitive fringe.

Rostow does not present a calculation of the prospective number of refineries under his plan or suggest exactly how many firms would be required to secure effective competition. Resting his case on some rather general testimony before congressional hearings, he suggests that very large scale refining is not required for efficiency and that the market could support a number of efficient firms which would not be regarded analytically as "few." The principal issues which he leaves unresolved are thus, first, what the critical scale for refinery efficiency may be; second, how many efficient firms a regional submarket could support; and, third, what number and size distribution of sellers constitute a minimum requisite for workable competition. There is room for argument on each of these points, and his case will not be strong unless we reach a particular sort of decision on all of them. Following the rough arithmetic presented above, it would seem that if we are simply going to replace a highly concentrated oligopoly (and oligopsony) with one somewhat less concentrated, then reliance on an automatically regulative competitive mechanism at the refinery stage is precarious.

This leads to the second main issue—that of whether price results would be more acceptable with Rostow's disintegrated and dispersed industry structure than at present. The complexities of oligopolistic behavior in the petroleum industry and the past record of price results suggest that it does not now closely resemble a model for monopoly or cartelized pricing. The uncertainties concerning prospective behavior under Rostow's alternative are numerous; regard the determination of crude-oil buying prices or refined-product selling prices if the structure of the refinery markets admits a significant degree of oligopolistic interdependence or the prospective alteration of price and nonprice rivalry in the distributive field after divorcement. The choice is not between single-firm monopoly results and those associated with pure competition but between a very complex oligopolistic pattern and one involving pure competition at one level, relatively unconcentrated oligopoly at another, monopolistic competition at another, and so forth. Although the latter situation is attractive in that it would reduce the concentration of economic power and increase opportunity for enterprise, the a priori prediction that it would significantly improve price results might be difficult to support. Certainly these peculiarly economic issues should be extensively weighed before we proceed along the policy line which Rostow suggests.

The questions raised concerning the emphasis of the author on these essential issues, of course, are not intended to detract from the very high quality of his work as a whole. His treatment of petroleum policy issues in general is penetrating and well supported and may well serve to induce economists and legislators to undertake a much-needed reconsideration of our governmental operations in this field.

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A REPLY

EUGENE V. ROSTOW

PROFESSOR BAIN'S helpful note defines two general issues on which, as he says, "a slight alteration in analysis or in the evaluation of evidence" could easily lead to a difference in conclusions. The first is whether something like the present plan of limiting crude production to estimated market demand (at a price) would be worth maintaining, in the interest of conservation, under a regime of unitization. Bain and I agree that

unified operations could conserve our oil (and steel) resources far more effectively than existing methods of controlling the output of crude. The second problem raised in Bain's review is whether considerations of efficiency in refining would not make a program of *horizontal* disintegration of the large refining companies under the antitrust laws excessively costly to society. Here again the area of agreement between us is broader than the point at issue, for we agree that society could gain much from a *vertical* separation of the major companies into their component functional parts, particularly by the divorce of their transportation facilities, since major-company ownership of pipe lines (and tankers) now largely restricts independent entry into the refining industry in consuming market areas. Further, Bain's question about *horizontal* separation of business units seems to be confined to the refinery phase of the industry.

Bain defines the conservation problem as that of achieving "the social optimum" in the relation of aggregate recovery to aggregate cost. This requires, I take it, not a policy of maximizing the supply of petroleum through time but of comparing the marginal present value of future supply with the comparable value of present use. The crucial variable in any such judgment is one's estimate of the future supply of liquid fuel. We are together in concluding that unitary operation of the oil fields could eliminate many important wastes of present production practice and that, under a system of unitization, output should be allocated among different fields on the basis of their location and efficiency. He asks, however, whether unitized fields should be allowed to carry forward production on a competitive basis to the point where marginal cost equals "current marginal revenue for the field minus the discounted present value[1] of any decrements to future net revenue resulting from current output extensions." Bain contends that our future oil supply should not depend on the dubious assumption that private and social costs are identical in oil production any more than in lumbering. I quite agree. Oil supply is obviously vital for the functioning and survival of our society. The rate at which oil reserves are used should not be determined by the market responses of the oil industry and its customers, unless society first collectively decides that the competitive rate of use would be a safe one. We are all far too willing as consumers to joy-ride on gasoline today, at the possible risk of having to walk or ride bicycles tomorrow. The issue between Bain and me, I believe, is twofold: (1) a somewhat different evaluation of the risk of running short of oil and (2) a distinct difference as to means of enforcing curtailment of use, if it is agreed that prudence requires a restriction of present in favor of future use of domestic petroleum reserves.

It is difficult to be dogmatic about the components of the domestic supply of, and demand for, petroleum products. We do not yet know how to predict levels of consumption for an economy working under the forced draft of full employment. And the technology of our power problem is changing at an astonishing rate. More than 90 per cent of new locomotives are Diesels; the trend is strongly to oil in heating homes and other buildings; the use of petroleum on farms has increased spectacularly, as a function of farm prosperity and of the developing use of smaller farm tractors; Diesel and gasoline electric power units, improved as a result of wartime developments, may become a significant element in the market for electric power; the number of planes, cars, busses, and trucks is growing at an accelerating rate. In 1940 our domestic use of petroleum products totaled 1.32 billion barrels. In 1946 it had risen about 40 per cent, to 1.79 billion; and in 1947 consumption was over 1.82 billion barrels. On the basis of conservative guesses as to military and export needs, it is estimated that in 1950 we shall use 2.2 billion barrels, a figure at least 20 per cent above present refining, transportation, and storage capacities.[2]

[1] Presumably in the judgment of the operator.

[2] W. Patton, *United States Petroleum Refining, War and Postwar* ("Department of Commerce, Office of Domestic Commerce, Industrial Series," No. 73 [1947]), pp. 69–91.

Against such a projection of demand, estimates of supply remain conjectural, though not alarming. The ratio of "proved" reserves to current consumption is now somewhat less than it was in 1941, despite recent important discoveries. With occasional exceptions, the process of exploration and drilling seems to be yielding diminishing returns at higher costs, and some oil geologists are convinced that great new fields are not so likely to be found as in the past. While the history of the industry is full of episodes of oil discovery over land dismissed by geologists as barren, national policy cannot rest on the gamble that such accidents will continue to occur. On the other hand, we are only at the threshold of using offshore oil, shale, natural gas, and, above all, coal as sources of liquid fuel. Except for natural gas (and perhaps coal), these are all raw materials considerably more expensive, given current technology, than crude oil. While the techniques of synthetic production will undoubtedly improve as they are used, the present position of crude supply in relation to expected demand, especially in the light of the security problem, supports the case for supplying Europe from the Middle East, developing synthetic and Caribbean production, and importing oil into the United States. The data offer less support, in my judgment, for present restrictions on domestic consumption of liquid fuels.

Given the state of information on these matters, there is plenty of room for differences of view as to the urgency of our conservation problem. I agree with Bain that some restriction in the current use of American crude reserves—and, in the light of the changing military problem, perhaps a good deal—should be undertaken. It is unnecessary for present purposes to push the issue to a point of arithmetical precision. Assume that prudent policy should rest on the most pessimistic evaluation of our chances for oil discovery and war. What follows?

Bain answers that crude output should be curtailed, presumably by giving each field a quota measured as a fraction of its potential production. The object of this program would be to achieve prices higher than those which would otherwise prevail, so as to eliminate certain lower-valued uses of petroleum and thus conserve supply. He concedes that such a program would mean (1) a utilization of productive capacity at less than an optimal rate, (2) an allocation of production more or less equally among high- and low-cost units, and (3) a monopolistic rent for producers, part of which he would remove by special taxation.[1]

However, price has not been and can hardly be an effective rationing device for accomplishing the purpose Bain has in mind. His argument neglects the pattern of discrimination in the structure of petroleum-product prices. The higher-priced uses of petroleum are precisely those for which there are no substitutes—i.e., gasoline. The cut in gasoline consumption to be achieved by raising its price in an inflationary economy is dubious, to say the least. Yet price increases are bound to fall most heavily on the parts of the product market least affected by competitive fuels. The price of fuel oil is kept low by the availability of coal, natural gas, electric power, or some other source of energy. If we want to begin a serious curtailment of domestic consumption of petroleum products (as contrasted, that is, with a program of curtailing the rate of use of crude-oil reserves), the place to start is by restricting the use of oil where coal, water-power, or natural gas would do: i.e., by cutting out the lower-priced, not the higher-priced, uses of petroleum. If it is determined that reduced consumption is necessary in order to cut the rate of withdrawal of American crude-oil reserves, in the name of conservation and military need, the rationing devices selected should be direct prohibitions or restrictions of certain uses. These could be supplemented by encouraging imports, subsidizing the development of alternative sources of liquid fuel, shifting to lower horse-power motors, and other devices for reducing the pressure on our oil reserves. Such methods, or a combination of

[1] See Joe S. Bain, *The Economics of the Pacific Coast Petroleum Industry*, Part III (1947), pp. 56–62.

them, could reduce the demand for the products of domestic crude-oil wells, without awarding all oil producers, high and low cost alike, a substantial subsidy in the name of conservation, and thus keeping the industry under strong economic pressure to expand. Limitations of this type, if deemed desirable in the light of a full appraisal of the supply situation, could be undertaken without undue confusion, by eliminating the *increase* in current demand and thus the necessity for capital expansion in the industry.

In the second part of his review Bain raises the question whether the number of refineries could ever be reduced enough, without an excessive sacrifice in efficiency, "to secure a competitive as opposed to an oligopolistic market structure" in the refining phase of the industry. Apparently we agree as to the desirability of some *vertical* disintegration in the industry, at least in the separation of pipe lines and tankers from major refining companies.[4] His doubts arise in response to my suggestion that some horizontal division of present refining companies be sought, in order to prevent them from dominating the market as buyers of crude or as sellers of refined products.

When discussing efficiency, Bain is apparently willing to limit himself to the direct internal economies of scale *in the refining plant*, minimizing the more controversial problem of whether great corporations normally enjoy economies or diseconomies as a result of grouping several refining plants and many other operations under the same management.[5]

The belief that big business is efficient—indeed more efficient than smaller business—is one of the most deeply rooted articles of faith in the American creed. It is not, however, an essential premise of the antitrust laws, as Judge Learned Hand has recently pointed out. He remarked that Congress in passing the Sherman Act "was not necessarily actuated by economic motives alone. It is possible, because of its indirect social or moral effects, to prefer a system of small producers, each dependent for his success upon his own skill and character, to one in which the great mass of those engaged must accept the direction of a few."[6]

The debate over the relative advantages of small and big business has been a recurring theme in the counterpoint of our history. One side tends to idealize big business as the highest expression of progress, modernity, and the scientific method, and as the breeding ground for an aristocracy of talent; often, indeed, it claims Darwinian sanction for the institution. The opposition, on the other hand, romanticizes small business as the natural provenance of the frontier spirit—invention, independence, and self-reliance—and the indispensable Jeffersonian foundation for a society which aspires to give its citizens the opportunities of American tradition.

The realities beyond the rhetoric are among the great tasks of social research. Is big business worth while, even in terms of the limited calculus of economic welfare? Are its diseconomies of advertising, unused capacity, product differentiation, and higher-than-competitive price balanced by advances in research, technology, and managerial leadership? Do technological advances come from the laboratories of industry, or do the industrial laboratories more often adapt and apply ideas generated in universities, engineering firms, or individual workshops? In some areas—medicine or steel, for example—the answer is pretty clearly in favor of independent, non-big-business research, at least for important innovations. Our wartime experience points in the same direction; an impressively large share of the technological advance came from abroad or from nonindustrial sources. On the other hand, some industries are so atomized—agriculture is the best example—as to provide little or no research of their own. In agriculture, forestry, mining, and certain other parts of the economy we have for some time socialized and subsidized research more

[4] *Ibid.*, p. 46.

[5] *Ibid.*, pp. 44–45.

[6] *United States* v. *Aluminum Co. of America*, 148 F. 2d 416, 427, C.C.A. 2d, 1945.

directly than has been the case for most applied science.

There is as yet no decisive answer as to the technological contribution of big business as a whole; and in the nature of the problem a clear-cut answer can hardly be expected, since the rate of invention depends so much on accident, managerial direction, and so on. It would be useful to have full histories of certain key technological developments in order to document the way in which ideas reach the engineering stage. In the absence of any such documentation a random sampling over a period of years indicates that the hunch of our tax laws (and latterly of our public support for scientific research) is a sound one, i.e., that in a competitive world our society cannot depend on industry's own research expenditure for its technology but should continue to subsidize fundamental science in the universities and elsewhere. To an extent which is surprising, in view of the size of industrial research budgets, original ideas continue to arise independently.

As far as the oil industry is concerned, I have elsewhere indicated my tentative conclusion that there need be no conflict between criteria of efficiency and those of competition—"workable" competition, at least, if not pure or perfect competition. The development of specialized engineering firms in the oil industry (and in others) affords one kind of assurance that valuable research can be carried on outside the big companies. And there is nothing in the proposal for the separation of extraction, transportation, refining, and marketing which could threaten the efficient continuity of research and managerial development in exploration, crude production, pipe-line or tanker operations, or distribution. On the contrary, more competition should increase the incentives for cost-reducing technological advance. The question raised by Bain in this context is focused on possible losses in refining efficiency which might follow decreases in the size of units, and increases in the degree of competition, in the industry.

The existing literature on the relation of size to efficiency is inconclusive. Generally speaking, people have studied either earning power in relation to size[7] or average unit costs in relation to size.[8] While the statistics so far produced are suggestive, they raise more problems than they settle.

Most observers would agree that efficiency, in the sense of minimal inputs per unit of output, is a function of important variables other than size, managerial ability and incentive being perhaps the most important. In appraising the efficiency of a pattern of industrial organization, the relative profitability of large and small firms cannot be conclusive. Higher profits may measure mere monopoly power, where larger firms seem to have the advantage. On the other hand, smaller firms are often in a superior profit position during a period of inflation, when they can charge all the market will bear with greater freedom than large firms, inhibited by their public relations policies and by the fear of antitrust attack. Nor can a comparison of the average costs of large and small firms under present technological conditions prove much more, since such comparisons offer no clue to the crucial question, from the point of view of economic welfare, whether the industry is taking advantage of all its available technological and managerial opportunities for cost reduction. Manifestly, firms face difference pressure for cost reduction at different stages of the

[7] W. L. Crum, *Corporate Size and Earning Power* (1939); R. C. Epstein, *Industrial Profits in the United States* (1934); J. L. McConnell, "Corporate Earnings by Size of Firm," *Survey of Current Business*, XXV (May, 1945), 6.

[8] Federal Trade Commission, *Relative Efficiency of Large, Medium-sized, and Small Business* ("T.N.E.C. Monographs," No. 13 [1941]); J. M. Blair, "The Relation between Size and Efficiency of Business," *Review of Economic Statistics*, XXIV (1942), 125; R. N. Anthony, "Effect of Size on Efficiency," *Harvard Business Review*, XX (1942), 290; J. M. Blair, "Does Large-Scale Enterprise Result in Lower Costs?" *American Economic Review Supplement*, XXXVIII (1948), 121. See also J. Steindl, *Small and Big Business* (1945); Joseph Schumpeter, *Capitalism, Socialism and Democracy* (1942), chaps. viii–xii; and Clair Wilcox, *Competition and Monopoly in American Industry* ("T.N.E.C. Monographs," No. 21 [1940]), pp. 309–14.

trade cycle, under differing labor conditions, and in different types of market structure. Perhaps the most important economic function of competition is to provide a testing ground for new ideas, new techniques, and, above all, new managerial talent.

Existing data on profits in the petroleum industry present some rather surprising problems. Crum's basic finding was that between 1931 and 1936 larger corporations in general made a greater average rate of return on capital than small corporations, profits in his study being defined as the residual return to equity after taxes and the payment of interest. This finding, he said, did not provide any basis for drawing conclusions about an optimum scale of operations but did give ground for opposing "punitive restraints on large industrial enterprise."[9] While the period he studies is evidently not symmetrical with periods of higher business activity[10] and his data may or may not support even the qualified inference he permits himself to draw, it is striking that the petroleum industry is an exception to Crum's general conclusion. The highest rates of return in the petroleum industry during 1936 were earned by corporations with less than $10 million in assets, the major companies earning less on their assets than all but the smallest corporations in the industry. "Petroleum," Crum concludes, "stands apart as an industry in which the simple relationship between earning power and size, which we have observed in several charts, does not prevail."[11] There may be many reasons for this apparent paradox, among others the favorable profit position under the tax laws of smaller corporations engaged mainly or exclusively in extracting crude. Nonetheless, Crum's findings, inferentially supported more strongly by McConnell for a later period, are part of the background of the question.

Comparing the average costs for large and small firms is even more slippery than usual in petroleum refining, since the issue of allocating costs to joint products is added to the common pitfalls of cost-accounting.[12] The Federal Trade Commission study, *Relative Efficiency of Large, Medium-sized, and Small Business*, the statistical methods of which have been severely criticized,[13] states that of one-hundred and ten nonlubricant refineries in 1929 and 1930, the lowest cost refineries were in each case medium sized (ten thousand to fifty thousand barrels per day) or small (less than ten thousand barrels per day), similar results being found for refineries where lubricants were made.[14] In view of the absence in the Trade Commission report of a satisfactory presentation of the over-all distribution of imputed costs by size of refinery, other data seem more pertinent. The materials presented at recent congressional hearings contain some valuable discussion of refinery costs and of the competitive problems in refining which are confirmed by other sources. The testimony to which Bain evidently refers in his note—that of Robert E. Wilson before the T.N.E.C.—is to the effect that direct operating refinery expenses are lower per unit in larger plants than in smaller ones, even where the smaller plants are efficient and up to date. Wilson testified that lowest operat-

[9] Crum, *op. cit.*, p. 7. Epstein, on the other hand, concluded that for the period of the twenties smaller corporations earned a higher return than large ones and that "beyond a certain point, mere size is accompanied by no increased effectiveness in production, at least as reflected in earning power" (*op. cit.*, p. 46).

[10] McConnell's study of the period 1931–41 shows an altogether different distribution of profitability by size as the process of recovery advanced (see *op. cit.*).

[11] Crum, *op. cit.*, p. 101.

[12] Thus, Robert E. Wilson, of Pan-American Petroleum & Transport Co., discussing refining costs: "When you come to gasoline cost, you have a problem a good deal like that of figuring the cost of a sirloin steak, and if you know the cost of buying and killing and dressing of beef it is largely a question of how you allocate the cost among the different products. The simplest thing to do would be to say, 'Let's divide them evenly,' but that means the cost of gasoline, kerosene and fuel oil comes out the same, and it is so ridiculous in its result that it doesn't seem very intelligent" (*T.N.E.C. Hearings*, XV, 8353–54).

[13] See Anthony, *op. cit.*, and Blair, *op. cit.*

[14] Federal Trade Commission, *op. cit.*, pp. 42–43.

ing costs would be found in a refinery plant capable of processing about sixty thousand barrels of crude a day and comprising two thirty-thousand-barrel-a-day refining units. Apparently the unit of optimum technological efficiency, in his opinion, was one capable of handling fifteen thousand to thirty thousand barrels a day. It was his conclusion that operating costs would not be reduced by increases of size beyond the sixty-thousand-barrel limit.[15] In 1939 a complete sixty-thousand-barrel-a-day refinery based on such equipment would have cost about $16 million. Developments since 1939, particularly the successful wartime operation of smaller catalytic-cracking units, throw doubt upon the present validity of Wilson's conclusion.[16] However, perhaps the simplest way to evaluate Bain's position is to accept Wilson's testimony as a working hypothesis.

Wilson's estimates rest not on a historical comparison of costs but on an engineering calculation, in 1939, of what costs would be if refineries of different sizes were to be built in different parts of the United States. The case he presents is one involving three complete refineries, using noncatalytic-cracking methods and assumed to be making gasoline, kerosene, distillate fuel oil, and residual fuel oil in the same proportions and on the same basis of high efficiency in management. He assumes that the five-thousand-barrel plant is located in the mid-continent area, the fifteen-thousand-barrel plant on the Gulf Coast, and the sixty-thousand-barrel refinery near Chicago. Capital investment would be $2 million for the five-thousand-barrel plant, $5 million for the fifteen-thousand-barrel refinery, and $16 million for the largest plant. That is, capital costs are estimated at about $400.00 per barrel of capacity for the smallest plant and $266.67 per barrel for the largest plant. The total estimated operating and overhead costs per barrel processed are estimated to be $1.407 for the smallest plant, $1.534 for the fifteen-thousand-barrel plant, and $1.616 for the sixty-thousand-barrel plant. The apparent advantage of the smaller plant is based largely on location factors. A five-thousand-barrel plant is practicable near the oil fields, whereas a sixty-thousand-barrel plant would normally be built only near a large consuming market area. If estimated transportation costs are eliminated, the cost superiority of the small plant disappears. Direct operating expense per barrel processed is estimated to be $0.16 for the smallest refinery, $0.11 for the medium size, and $0.08 for the largest plant. However, transport costs cannot be ignored or eliminated from such calculations, although they might have been computed more realistically on the basis of pipeline costs, not rates.[17]

Wilson's case is, of course, a hypothetical one, and a refining plant of lowest refinery operating costs per barrel processed will not always be the most efficient or the most profitable, where factors of location, or an emphasis on particular products of high value, indicate otherwise.

However, let us take Wilson's case as a basic one, for the sake of discussion, and ignore some recent developments, particularly in the field of catalytic cracking. Let us assume, that is, that refineries of thirty thou-

[15] Wilson, *op. cit.*, p. 8352. The largest operating unit then practicable was thirty-five to forty thousand barrels per day (p. 8634). "The size of the refinery as a whole is not as important from the standpoint of cost as is the size of the individual refining units; but in order to approach minimum cost it is desirable that a refinery be large enough to permit the use of at least one 15,000 bbl. combination cracking unit" (p. 8635).

[16] Patton, *op. cit.*, p. 29: "Since meeting the wartime need for catalytic-cracking capacity, considerable effort has been directed toward the construction of a unit small enough to be operated economically in connection with a small distillation plant. Some of the larger companies have been erecting catalytic cracking units at their smaller plants in the neighborhood of 10,000 B/D capacity or less. The successful operation of these units may pave the way for the adoption of the operating methods by small companies and at less risk than had been required previously.

"One engineering firm reports a catalytic-cracking unit small enough to be charged with the gas oil output of a crude distillation plant with a capacity of 4,500 B/D. Another firm talks of its small unit in terms of a needed throughput of from 1,000 to 1,500 B/D."

[17] Wilson, *op. cit.*, pp. 8634–40.

sand to sixty thousand barrels a day of capacity have the lowest operating costs and represent the largest units in which important economies of scale are realized. Even if Wilson's 1939 estimates of cost are doubled for present conditions, the capital required for such a refinery is not beyond the reach of relatively small business. A corporation need not be as big as Standard of New Jersey or Cities Service to undertake an outlay of $20–$30 millions. If we are to consume something over two billion barrels a year by 1950, we should require between 100 and 130 refineries of optimum size, giving minimal weight to the need for periods of shutdown for cleaning, the economic advantages of smaller plants in certain areas or markets, and so on. In 1946 there were 453 refineries in the United States, of which 57, with capacity of more than twenty-five thousand barrels per day, had 65 per cent of total capacity, while 335 with capacity of less than ten thousand barrels a day had 18.3 per cent of capacity (over 4 per cent of the capacity in this group belonged to larger companies). Small companies owned three-fourths of the plants but only 5.8 per cent of total capacity.[18] A market which contained about 100 large and efficient refineries, in addition to a normal number of smaller plants, each refinery being an independent purchaser of crude, divorced from transportation and marketing, would be a very different market from that which we know today. Even that result, as Bain points out, might be a long way from perfect competition, unless the development of efficient smaller refining plants continued rapidly in an oil environment so transformed. The barrier to smaller refining plants persistently emphasized in most discussions of the problem is the absence of an assured supply of crude and the cost of transportation, not the inherent diseconomy of the smaller scale.[19] I should guess that the removal of present barriers to entry into the refining business would result in a considerable development of plants which would prove profitable and economical at well below a sixty-thousand-barrel-a-day capacity.

Bain is quite right in pointing out that I did not attempt to specify the point at which a diffuse oligopoly becomes a competitive market, and I should prefer not to do so without far greater particularity as to the circumstances of the case—the disposition of brand names, for example, the number and size of existing plants, and the possibility of competition with products from other parts of the country or from abroad. In considering the feasibility of a policy of competition for the oil industry, I thought it undesirable to go too far toward rigid detail on the character of possible remedies. In writing about a dynamic industry like oil, it would be dangerous as well as premature to draft an antitrust decree. Whatever one said in 1946 would be quickly out of date. I felt that the data then available established the fundamental proposition that technological factors in efficiency had little or nothing to do with integration, whether horizontal or vertical,[20] and that refining operations could be efficiently conducted with a basic capital of $16 million and probably a good deal less. From that, it followed that one could seriously consider using the forces of the market to achieve a greater degree of competition than now prevails, with the distinct likelihood of lower prices and less waste. Even if there were only twenty principal refineries, of approximately equal size, and a good many smaller ones, in any major consuming market area, the social results should be worth seeking. One could expect under such circumstances a less pronounced interest in the brand name of the refiner, a substantially greater reliance on price competition rather than on selling costs as a technique for altering a seller's share of the market,

[18] Patton, *op. cit.*, pp. 18–23.

[19] See, e.g., R. B. Shuman, *The Petroleum Industry* (1940), p. 67. And note, "While small refineries can be constructed with the same physical efficiency as large ones, the natural economic advantage of large-scale operations in areas tributary to concentrated markets has tended to develop refining on a mass-production basis" (Joseph E. Pogue, *Economics of the Petroleum Industry* [1939], p. 37).

[20] Wilson, *op. cit.*, pp. 8331–45 and 8668–69.

easier entry into the field, and experiment with technological alternatives in the scale of production. It should be possible, even under Wilson's sixty-thousand-barrel rule-of-thumb, to achieve markets in which price leadership among refiners would be difficult to establish and maintain. My own guess is that one might realistically anticipate more, through the competitive process of entry. But that is a good deal.

Bain is doubtful whether the present Supreme Court would support a program of competitive reorganization on such a scale under the antitrust laws. The recent decisions in the movie industry cases,[21] considered in the light of many other vigorous recent Sherman Act decisions, offer serious ground for contending that the Sherman Act can actually be used to bust trusts. Without attempting an analysis of the court's opinions, the movie cases mean at least this: the existence of substantial economic power over a market (local or national) offends Section 2 of the Sherman Act; size is a vital "earmark" of such power; while vertical integration is not illegal per se, it is considered with a dubious eye; and, finally, where illegal market power is obtained, the normal (and not the extreme) remedy is dissolution and divestiture.[22] This catalogue of propositions is a formidable challenge to the prevailing structure of most of our basic industries and applies with particular force to the problems of petroleum.

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[21] *United States* v. *Paramount Pictures, Inc.*, 68 Sup. Ct. 915 (1948); *United States* v. *Griffith*, 68 Sup. Ct. 941 (1948); *Schine Chain Theatres* v. *United States*, 68 Sup. Ct. 947 (1948).

[22] My own view of these developments is set out at length in "Monopoly under the Sherman Act—Power or Purpose?" to be published in the *Illinois Law Review* early in 1949.

A REJOINDER

JOE S. BAIN

CONCERNING Rostow's position on conservation as elaborated in the preceding note and regarding his interpretation of my stand, I should like to add the following. First, possible deviations from optimum conservation under unitization would not result simply from differences between private and social costs but also from differences between private and social optimum time patterns of production. The latter sort of difference would be especially important if the two groups made substantially different estimates of the future discovery rate but could remain significant even if they agreed on the future volume of supply. Second, I do not concede that an improved curtailment program, such as I propose as an adjunct to unitization—one involving curtailment of unit-field outputs—need involve the use of economically undesirable formulas for allocations or that production should be allocated equally between high-cost and low-cost units. Curtailment need not involve such deficiencies; so far as it did, within a unitized setup its economic disadvantages would not be of the same order as those encountered when quotas are assigned as at present to each well. Third, I agree that the burden of curtailment should fall on the output of low-valued products and am quite aware that in the absence of special measures it might not. Rather than simply rationing these products, however, I should favor (1) over-all curtailment of crude output and (2) taxation of low-valued products more or less equivalent to gasoline taxation. This would tend to eliminate the legally imposed discrimination in price between highway and nonhighway uses which we have at present. Excess profits resulting from curtailment should probably be taxed away.

Regarding refinery size and efficiency, I should like first to underline Rostow's suggestions concerning the unreliability of much available statistical material bearing on this issue. For example, comparisons of earnings of integrated firms with different

proportions of their assets invested in crude production are a priori meaningless since the rate of profit in crude production is not closely related to that in refining. The F.T.C. study of refinery costs (as of 1929–30) is best entirely forgotten. It deals with a nonhomogeneous population in which the product-mix and value of output probably differ systematically among size groups of refineries. I shall not take the space to analyze the complex statistical data on scale mentioned in Rostow's footnotes. But I want to point out that the optimum scale of one technical unit within a complex refining plant is not a direct index to the optimum scale of the basic distillation throughput capacity needed to feed one or more such units in a balanced operation. Further, some of these estimates per se are of uncertain significance to the issue at hand. If we accept an engineering estimate of a refinery of sixty thousand barrels basic throughput capacity as of optimal scale, an increase of national consumption to two billion barrels annually would theoretically permit an extreme of about one hundred optimum-scale refiners replacing the twenty "majors" and a part of the existing fringe of independents. This, in turn, would permit from fifteen to thirty separate refiners in a regional submarket—like the Pacific coast market or the North Atlantic seaboard market. With lower consumption figures, however, the numbers would be smaller; and we must also allow for the administrative impossibility of getting the average plant size down to sixty thousand barrels when single plant units are often already built to one hundred thousand barrels or more capacity.

Whether the probable revision of refinery market structure would result in "workable competition" seems uncertain, especially so far as there seems to be available no concise definition of "workable competition." Price results might or might not become more desirable from the standpoint of over-all welfare. There is no good a priori reason for believing that they would have to be; yet we are invited to experiment in the hope that they would be. So much for the possibilities of a more dispersed refinery market structure after vertical disintegration. With respect to this disintegration per se, I should prefer to limit myself to the observation that society would probably not lose much by it and might gain enough to make it worth while. The issue of how disintegration and dispersion would affect the rate of technical progress seems to me, on a priori grounds, to be unresolved.

THE CASH RATIO IN ENGLISH BANKS BEFORE 1800

J. K. HORSEFIELD

THE problem of an appropriate cash ratio must, of course, have been faced as soon as banks began. We know that in Barcelona in the fifteenth century there was already a recognized ratio, approximating 29 per cent, the reserves of the Bank of Deposit (in some respects a local central bank) being slightly higher than those of the other banks.[1] In the next century the Fuggers—whose business was, however, less concerned with short-term liabilities—appear from their surviving balance sheets to have held a much smaller reserve. Their ratio seems to have varied between about 1½ per cent to 3½ per cent in cash, plus a stock of copper (and, at first, also silver) which was presumably fairly liquid and thus provided a "second line of defense," of about 10 per cent in 1527 (when the business was still a family one) and 15 per cent in 1546 (by which year they were accepting deposits).[2]

In English economic literature the problem of the appropriate cash ratio for a bank to hold attracted little systematic attention before about 1832. The suggestions thrown out earlier by a large number of writers were in the nature of obiter dicta. It is, however, interesting to consider these, since the figures on which they converge may have had considerable influence on the Bank of England at a critical period in its history.

The earliest allusion to a cash ratio of which I am aware occurs in the well-known tract *The Mystery of the New Fashioned Goldsmiths or Bankers* (1676). The author is discussing the expenses of bankers, by reason of which, "if they do not take nine *per Cent* interest for what they lend and dispose of, they cannot make one of one, much less subsist." Among these expenses he cites that "they must have a great dead Stock of Cash to answer all Payments, and be always ready occasionally to advance great Summs." This suggests that the cash ratio he had in mind was a considerable one and that his subsequent allusion to a 10 per cent ratio referred (as in its ambiguity it might) to the ratio of capital rather than of cash, to liabilities: "I suppose people will suddenly come to their wits, and begin to examine why a Goldsmith banker should be better security than another man, or fitter to be trusted for ten times more than he is worth."[3]

On the other hand, this may have been understood by contemporaries to refer to a cash ratio, which at any rate seems more relevant to the comment on this quotation in an answering tract which bears the fascinating title, *Is Not the Hand of Joab in All This?:* "Shall I ask our Author whether this was practized without reason and good experience by those that did it?" (p. 14).

Whether or not a ratio of one-tenth was in fact contemplated in 1676, the next generation of writers thought this too low and suggested figures ranging from one-sixth to one-third. An early allusion is to be found in one of the pamphlets advocating the founding of the Bank of England "if the proprietors of the Bank can circulate their own foundation of £1,200,000 without having more than two or three hundred thousand pounds lying dead at one time or another."[4] That is, a cash ratio of one-sixth to one-quarter. An intermediate figure is sug-

[1] A. P. Usher, *Early History of Deposit Banking in Mediterranean Europe* (Cambridge, Mass., 1943), p. 181.

[2] R. Ehrenberg, *Capital and Finance in the Age of the Renaissance*, trans. H. M. Lucas (London, 1928), pp. 87, 103, 128.

[3] *Mystery of the New Fashioned Goldsmiths* . . . (London, 1676), p. 7.

[4] *A Brief Account of the Intended Bank of England* (1694), quoted by Thorold Rogers, *The First Nine Years of the Bank of England* (Oxford, 1887), p. 24; he attributes it to Paterson.

gested in Sir Francis Brewster's *Essays on Trade and Navigation* (1695). Banks being admittedly useful, he proposes that one should be established by Act of Parliament in every shire, "the Fund to be Land and Money,"[5] and, as to the need for the latter, "perchance Two Million Pounds of Ready Money may answer Ten Millions in the Current Payment of the Nation; for that few will take Money out, but transfer from one account to another."[6]

In the following year Charles Davenant, in his capacity as economic consultant to the Treasury, wrote *A memorial concerning Credit*,[7] in which there are several references to the extent to which bullion could be economized by using bank notes. Prophesying that "the ffairness of the New Coyne, it's certain value, and ye ease of telling it," will lessen the use made both of the "Banking Goldsmiths" and of the Bank of England, he foresees that this "will lessen the Kingdomes generall stock because a Million Trusted in either of their hands, does the office of three or four Millions in the way of Trade."[8] When, later on in his memorandum, he comes to his recommendations, he is concerned to make the best use of the ready cash available in the country, which he estimates at seven million pounds.[9] For this purpose he proposes to establish "Banks . . . in some of the cheif Cityes and places of Trade,"[10] since, if "Paper Credit" is expanded, "ten thousand pounds in Cash will every where do all the offices of thirty thousand pound."[11] And again: "Seven Millions of the Species may erect a Credit of twenty one (and by Artificial helps) perhapps of two and forty Millions."[12]

Writing about this time, Anthony Hammond, Member of Parliament for Huntingdon, observes that twenty millions of specie ought to float eighty millions of notes.[13] In Scotland similar figures were being discussed. John Law quotes one-quarter or one-fifth as the cash ratio recognized in 1705,[14] and a manuscript pamphlet of 1708 on the subject of the Land Bank has the same figures.[15]

A little later (1721) we find in an anonymous English pamphlet the first indication that the cash ratio had become the subject of a convention:

> Those who have had Occasion to make Observations upon the Nature of *Banking*, do Remark, and will needs have it to be a Rule in Banking, that to circulate any quantity of Notes, will require a Summ, to the Amount of a *fifth Part* at least, of the Extent of the Notes circulated.[16]

The author of the pamphlet, however, had his own, rather more complicated, views on the subject, according to which the larger a bank was, the smaller ratio it needed to hold:

> A Sum in *Specie* will serve to circulate Notes to a much greater Value; and still as the *Specie* is encreased it will circulate Notes in a *greater* Proportion: for suppose that *Two Millions* were able . . . to circulate only *Ten Millions* in Notes . . . yet with the Addition of *One Million Specie more* . . . they would be able to circulate . . . *Thirty Millions in Notes* . . . and if more Specie is still supposed, then the Circulation would be yet to a greater Proportion. . . .[17]

While the idea is interesting, the figures are rather difficult to accept. If a bank with a note circulation of ten million pounds needed a 20 per cent cash ratio, it seems improbable that one with thirty million pounds

[5] *Essays on Trade and Navigation* (London, 1695), p. 110.

[6] *Ibid.*, p. 112.

[7] Dated July 15, 1696. Printed for the first time in 1942 by the Johns Hopkins Press, Baltimore (ed. G. Heberton Evans, Jr.).

[8] Davenant, *op. cit.*, p. 3 (Evans' ed., p. 69).

[9] *Ibid.*, p. 34 (Evans' ed., p. 96).

[10] *Ibid.*, p. 43 (Evans' ed., p. 103).

[11] *Ibid.*, p. 44 (Evans' ed., p. 103).

[12] *Ibid.* (Evans' ed., p. 104).

[13] Quoted by Rogers, *op. cit.*, p. 72 n.

[14] *Money and Trade Considered*, reprinted in Paul Harsin, *John Law: Œuvres complètes* (Paris, 1934), I, 38–39, 60.

[15] Quoted by Graham, *The One Pound Note* (Edinburgh, 1886), p. 21.

[16] *Proposal for Restoring Credit* (London, 1721), p. 38.

[17] *Ibid.*, p. 12.

could succeed with only 10 per cent. That larger institutions still could manage with even smaller ratios seems highly unlikely in the conditions of the time. Indeed, it is surprising that anyone putting forward a "proposal for restoring credit" in the wake of Law's gigantic schemes, which had just crashed to ruin in Paris, and of the "South Sea Bubble" could support the view that size meant strength.

A near-contemporary of this anonymous pamphleteer, Richard Cantillon, had a much more intelligent approach to this—as indeed to many other monetary problems—than the majority of men in his period. He argued that what determined the appropriate cash ratio was the nature of the liabilities held:

> If a hundred economical gentlemen . . . deposit each one 10,000[18] ounces of Silver with a Goldsmith or Banker . . . the Banker will often be able to lend 90,000 ounces . . . and will only need to keep in hand . . . the tenth part of his deposits. . . .
>
> If 100 individuals . . . deposit with a Banker their income every six months as it is received, and then demand their money back as and when they have need to spend it, the Banker . . . can hardly lend . . . more than about one-half of the sums which he owes. . . .
>
> If those who deposit money with the Banker are Undertakers and Merchants who pay in large Sums daily and soon after draw them out, it will often happen that if the Banker divert more than one-third of his cash he will find himself in difficulties. . . .[19]

That is, the appropriate cash ratio might be anything from 10 per cent to 66⅔ per cent according to the stability or volatility of the deposits. Elsewhere, in discussing the Bank of England, he suggests in one place that the reserve ratio may be one-quarter[20] and in another "one-fourth or one-sixth."[21]

Sir James Steuart, writing in 1767, suggested that if "a number of men of property join together in a contract of banking . . . Nothing but experience can enable them to determine the proportion between the coin to be kept in their coffers, and the paper in circulation. This proportion even varies according to circumstances."[22] Apropos the Bank of England, however, he quotes "Mr. Megens, a very knowing man" as computing that the ratio is one-third:

> They [the Bank of England] make a yearly Profit of 220,000 Pounds out of the Money of the People who keep Cash with them. . . . And . . . I conclude that the Credit-cash in their Hands may amount to 11,000,000; and thereout is employed in Loans to the Government, discounting of Bills and in buying Gold and Silver, 7,333,333⅓ Pounds, which at three *per Cent.* Interest or Profit, will amount to the above 220,000 Pounds, and remains 3,666,666⅔ in Cash sufficient for Circulation and current Payment.[23]

The same figure is quoted by Isaac de Pinto, whose *Traité de la circulation et du crédit*, appearing anonymously at Amsterdam in 1771, was published in an English translation by Rev. S. Baggs in 1774:

> On a toujours cherché à calculer la proportion qu'il doit y avoir entre les espèces courantes at les papiers de crédit; et il y a longtemps qu'on l'avoit fixée comme 3 est à 1, c'est-à-dire qu'il peut y avoir, sans danger, trois fois autant de papier dans la circulation qu'il y a de monnoie. ... Si l'on veut appeller cela disproportion, ... c'est aller contre l'expérience.[24]

Adam Smith does not in specific terms discuss the appropriate cash ratio for a bank; but in his chapter on money he cites two examples, in one of which a bank keeps a cash reserve equal to 20 per cent of its notes and, in the other, 25 per cent.[25] It may

[18] So (*dix mille*) in original but apparently an error for 1,000 (cf. Postlethwayt, *Universal Dictionary* [London, 1774], *s.v.* "Banking").

[19] *Essai sur la nature du commerce* (1755), pp. 397–403 (= pp. 299–303 in Higgs's ed., here quoted). The arguments are reproduced by Postlethwayt, *op. cit.*

[20] *Ibid.*, pp. 407–8 (Higgs's ed., p. 307).

[21] *Ibid.*, p. 421 (Higgs's ed., p. 317).

[22] *Inquiry into the Principles of Political Oeconomy* [London, 1767], II, 150.

[23] Nicholas Magens, *The Universal Merchant* (1753), sec. 60, quoted in Steuart, *op. cit.*, II, 158.

[24] Original ed., p. 147. (I have not seen the translation.)

[25] *Wealth of Nations* (1776), 4th ed. of Cannan's ed. (London, 1925), I, 276, 285. This dualism is

be assumed that he regarded these as reasonable figures. However, twenty years later the figure of one-third recurs, being put forward as a generally acceptable supposition by a representative committee of City men:

> If the Bank [of England] should make it a rule to keep in coin, one-third of the whole amount of their Notes in circulation . . . if . . . Bankers keep one-third of the notes . . . deposited [with them] to answer the demands which may be made upon them. . . .[26]

It will be noticed that no distinction is drawn here between the ratio appropriate to the Bank of England and that suitable for an ordinary bank. Conceivably, the greater responsibilities of the former as the "*dernier resort*"[27] were regarded as matched by the greater liability of ordinary banks to "runs" on suspicion of unsoundness. It may also be hazarded that a possible explanation of the considerable divergence of view between Adam Smith and the City was that in Scotland, where banking by the end of the eighteenth century was generally more stable, the ratio of 20–25 per cent discussed by John Law in 1705 was still thought adequate, whereas in London experience had shown that a larger ratio was necessary.[28] But all this was necessarily surmise, for the facts were not to be made known for another thirty years.

A determined but unsuccessful attempt to elicit information about the cash ratio of the Bank of England was made by the House of Commons Committee of Secrecy on the Outstanding Demands of the Bank of England, 1797.[29] The committee appears to have expected (as did the City merchants quoted above) that the Bank would hold a cash reserve bearing some determinate ratio to the note issues alone and not to notes plus deposits. Thus, on March 23, 1797, they asked Samuel Hoare, a member of the banking firm of Barnett, Hoare, Hill and Barnett[30] and a shareholder in the Bank of England:

> Is it now, or was it ever your Understanding or Opinion, that the Bank of England, kept Cash equal, or nearly equal, to the Amount of the Sums secured by all the Bank Notes in Circulation?

To which Hoare answered:

> No; my opinion is, that they generally preserved a Proportion, as 3 to 5, that is, if they had three Millions Sterling they might Issue five Millions Paper in Times of Security—this was only an Opinion, as I have no Knowledge on the Subject.

Pressed to state whether he meant that the Bank actually had kept such a proportion or that they ought to do so, Hoare added that "they had generally preserved that Proportion until the Commencement of the War."[31]

Eight days later the committee interviewed the governor of the Bank of England, Daniel Giles, and also the influential Samuel Bosanquet, who had been a director since 1771 and governor in 1791–93. From the

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copied in *The Utility of Country Banks Considered* (London, 1802), pp. 36, 41. (This book was strongly criticized by the *Edinburgh Review*, I, 106, as a poor pastiche of Hume and Smith, but it seems to have had some circulation.)

[26] Report (April 5, 1796) of the committee appointed at "a Select Meeting of Gentlemen interested in, and acquainted with the principles of, internal Circulation, held at the London Tavern, on Saturday, the 2d of April 1796." The report was drawn up by Walter Boyd and is reprinted in his *Letter to the Rt. Hon. William Pitt* (London, 1801), pp. 91–101. The extract cited is from p. 94.

[27] Baring, *Observations on the Establishment of the Bank of England* . . . (London, 1797), p. 22.

[28] Evidence in support of the ill repute of English bank notes in the eighteenth century abounds in the contemporary law reports, which record, *inter alia*, juries' opinions about a reasonable time to hold a bank note without cashing it, varying from twelve hours to three days. Contemporary accounts of Scottish banking do not suggest such a high expectation of disaster.

[29] The quotations are from the "Minutes of Evidence" accompanying the second report of the committee.

[30] F. G. Hilton Price, *A Handbook of London Bankers* (London, 1890–91 ed.), p. 14.

[31] I.e., February 1, 1793.

former they elicited that the cash was watched:

Q. Do not the Bank Directors regulate their Issues upon discounts by an attention to the proportion of Cash in their coffers and the amount of their outstanding Notes?

A. They ought to do so, and generally do regulate their conduct in consequence.

On the other hand, Bosanquet expressly stated that, "although the Directors have Attention to the State of their Cash and Notes out, yet they have no stated or precise Rule to regulate their Conduct." Bosanquet had, however, offered in earlier evidence by implication an intelligent and interesting reason: "It is possible for the Bank to be in a much safer situation, with a much smaller sum in specie when public affairs are prosperous, than with a much larger sum and an apprehension that that sum is draining away."[32] This showed that in his mind a fixed cash ratio was a misleading concept.

As a matter of fact, as we now learn from Clapham's researches,[33] the Bank in the mid-eighteenth century was accustomed to keep a ratio of 38–40 per cent in favorable years, falling to 25 per cent in bad times such as that year of war, 1744. And from 1778 on, the complete story is known, at least for half-yearly dates, having been extracted and compiled by the House of Commons Committee of Secrecy on the Bank of England Charter, 1832. Nevertheless what these statistics emphasize is not so much the possible norm as the sharp fluctuations actually experienced, which in the last quarter of the century ranged from 5 per cent in 1783 to 52 per cent in 1790, 23 per cent in 1793, 41 per cent the next year, 8 per cent in 1797, and 36 per cent in 1799. The caution of Messrs. Bosanquet and Giles is easily understood.

It must, therefore, have been difficult for the Bank to have been driven to form a view on what the proper cash ratio should be. Yet the ban on payments in cash, imposed in February, 1797, was not expected to last long; and it was clearly necessary for the Bank to decide at what level of the cash ratio it would be safe to resume convertibility. As a matter of fact, the Bank made some tentative overtures toward resuming cash payments in October, 1797, but these were rejected by the government.[34] It would be instructive to know what the cash ratio was at that moment, but we can only presume that it was somewhere between the 21 per cent recorded at the end of August, 1797, and the 30 per cent attained in the following February. Fortunately, when next the Bank took the initiative, its position can be seen more clearly. It was on January 3, 1799, that the Bank gave notice of its readiness to pay in cash (from January 14) all fractional sums under five pounds and (from February 1) all notes of one and two pounds value dated before July, 1798.[35] At that moment the cash ratio must have been almost exactly one-third, since it was 32 per cent in August, 1798, and 36 per cent on February 28, 1799. It seems, therefore, not unreasonable to assume that by 1798, at any rate, the Bank of England had come to accept as a norm that cash ratio of one-third which reappeared as the "Palmer Rule" in 1832[36] and which dominated market thought as late as 1914.[37]

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[32] "Minutes of Evidence," March 14, 1797.

[33] *The Bank of England: A History* (Cambridge, England, 1944), I, 156.

[34] *Ibid.*, II, 4.

[35] Tooke, *History of Prices* (London, 1838), I, 240.

[36] House of Commons Committee on the Bank of England Charter, 1832: "Minutes of Evidence," Q.72.

[37] See, e.g., Leaf, *Banking* (London, 1926), p. 41.

SIGNIFICANCE OF BANK CAPITAL RATIOS

HELEN J. MELLON COOKE[1]

THE adoption of a legally required minimum total bank capital–asset ratio has recently been proposed to provide "a rough administrative guide to assure a margin sufficient to meet normal banking needs."[2] The minimum acceptable ratio, even though based upon book values, it is held, would provide "a reasonable margin of protection against losses which examination procedures fail to detect as well as those which may occur between examinations." Detailed examination of banks with unduly low capital margins would then follow to disclose the reasons accounting for the particular capital ratio in each instance. A lower than average capital ratio is thus assumed to be an indication that the particular institutions may be engaging in unsafe and unsound practices.

Data compiled from the annual reports of the Comptroller of the Currency show that, although their surplus and reserves had been wiped out, national banks which failed during the twenty-five-year period from 1920 to 1944 generally had only slightly lower capital-deposit ratios[3] at the date of failure than active banks (Table 1). In several years, especially since 1938, the failed banks actually showed higher ratios than active ones. Except for two years, the average capital-deposit ratio of the failed banks ranged from 10.6 per cent to 32.3 per cent. The latter peak was shown by banks that failed in 1934. It is obvious, of course, that, as soon as depositors become wary of the condition of a bank and begin to withdraw their funds in more than normal amounts, a bank's capital ratio automatically increases.

The average capital position of all active national banks has experienced an almost steady decline since 1935 to a present low point of less than 7 per cent. Before World War I capital accounts in active national banks were equal to approximately 25 per cent of their deposits.[4] The percentage declined to 15 per cent in 1920, and until 1935 the average capital position remained at or above this level. A peak average capital position of almost 19 per cent of deposits was reached in 1932, during the nadir of the banking collapse.

The decline in the capital ratio has right-

[1] The writer is an economist on the staff of the Federal Reserve Bank of New York. This note represents her personal views and not necessarily those of the Bank.

[2] Tynan Smith and Raymond E. Hengren, "Bank Capital: The Problem Restated," *Journal of Political Economy*, December, 1947.

[3] Historically, the capital ratio has referred to the ratio of deposits, for which information on suspended banks is available. A comparison with assets would seem, however, to be more acceptable logically. The difference between the two ratios, however, is not one of material importance.

[4] The declining trend in the capital ratio is not a phenomenon of the twentieth century alone. For example, in October, 1870, the capital accounts of banks belonging to the national banking system exceeded 80 per cent of their deposits. This ratio was maintained fairly well until 1878. After that date it began to decline and by 1900 was close to 27 per cent. The decline reflected largely a more rapid rise in loans and discounts than in capital accounts. The ratio of capital to notes and deposits was somewhat lower and the decline in that ratio less pronounced. Since the notes were backed specifically by government bonds and in later years became a minor portion of liabilities, they were excluded from this comparison. An interesting comment on the effectiveness of the capital ratio was made as early as 1831 by Albert Gallatin, one of our outstanding secretaries of the treasury. He pointed out that it may be desirable to impose a limitation on the amount of the loans and issues of the banks by requiring a certain proportionate relation of debt to capital, but it must not be forgotten that "the ultimate solvency of a bank depends always on the solidity of the paper it discounts." Cited in my study *Credit Control* (Washington: American Council on Public Affairs, 1941), p. 87.

ly caused concern in banking circles as well as in supervisory agencies.[5] This has been specially true during the current postwar period when bank holdings of United States government securities have declined, and a steady rise in loans, that is, the risk assets, has occurred.

TABLE 1*

CAPITAL RATIOS† IN ACTIVE AND FAILED NATIONAL BANKS

Year	All Active National Banks‡	Suspended National Banks§
1920	15.3	10.9
1921	18.5	15.1
1922	17.4	21.9
1923	17.0	18.0
1924	15.9	16.9
1925	14.9	15.8
1926	15.0	14.1
1927	14.9	14.1
1928	15.8	14.5
1929	17.0	12.9
1930	17.1	14.1
1931	16.9	13.7
1932	18.8	14.0
1933	17.0	15.1
1934	15.1	32.3
1935	13.7	17.9
1936	12.1	6.8
1937	12.0	9.4
1938	12.2	25.6
1939	11.5	16.6
1940	10.5	.....
1941	9.6	10.6
1942	7.4	.....
1943	6.6	13.0
1944	5.9	.....
1945	5.5	.....
1946	6.5	.....

* Source: Computed from data in the annual reports of the Comptroller of the Currency.

† Capital as a per cent of deposits.

‡ Based on data as of June 30 of each year through 1941 and as of December 31 for 1942–46. Capital includes surplus and net undivided profit.

§ Based on data for year ended October 31 through 1941 and during year ended December 31 for 1942–46. Capital represents capital stock only. Both capital and deposits are as of the date of failure.

Underlying the proposal for the establishment of a standard capital-asset ratio is a criticism of our current policy of bank examinations. It is admitted that "the most effective way to handle the wide variety of problems confronting individual banks is through the examination procedure." Yet it is suggested that a standard capital-asset ratio will provide a guide for protection against losses which examination procedures fail to detect.

The most obvious shortcoming of the capital-asset (or capital-deposit) ratio derived from published statements is that it is based on the book value of assets. If the overvaluation of assets is not discovered in the regular examination, it is unlikely that the accounting procedure in any particular institution would be changed during the period between examinations so as to reveal its weakness.

A critical appraisal of the soundness of the individual bank's assets is required to provide a better measurement of the protection afforded depositors. The spreading practice of setting up valuation allowances against specific items indicates the growing acceptance of this viewpoint by the banks.[6] It may be that more frequent and exhaustive examinations are required, but the findings of this rather superficial examination of suspended banks would seem to indicate that the capital ratio as such has very little detective value.[7] Rather it provides a meas-

[5] J. Brooke Willis, "Bank Capital," *Financial Highlights*, the Chase National Bank, Department of Financial and Business Research, April 10, 1946; see also H. M. Stillman, "Adequate Bank Reserves," *American Banker*, March 6, 1946.

[6] Under instructions issued December 10, 1947, by the Bureau of Internal Revenue, these banks are now permitted, beginning with the calendar year 1947, to compute their deductions for bad-debt reserves on the basis of the average losses of twenty years, provided that no additions to the reserves may be made that will result in the total of such reserves exceeding three times an amount calculated by multiplying the outstanding loans at the end of the taxable year by the average ratio of bad-debt losses to outstanding loans during the same twenty-year period. Previously, the practice had been to use a shorter period of time, often five years, in computing such reserves.

[7] For a comprehensive study of failed banks see Horace Secrist, *National Bank Failures and Non-failures* (Bloomington, Ind.: Principia Press, 1938). This book was called to my attention after this note had been written.

ure of the changing structure of our banking system as a whole.[8] At this point, it may be suggested, without going into detail, that, even though its selective value appears questionable, a required capital ratio may prove advantageous as a general credit control device. However, even in this case the problem of existing differences among individual banks could not be overlooked, and varying requirements rather than a single uniform ratio would probably be more desirable.

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[8] The importance of evaluating the decline in the level of the over-all capital ratio in terms of the changed composition of bank assets has been re-emphasized in an excellent paper recently published by Roland I. Robinson, "Bank Capital and Dividend Policies," *Harvard Business Review*, July, 1948.

BOOK REVIEWS

Studies in the Theory of Welfare Economics. By MELVIN W. REDER. New York: Columbia University Press, 1947. Pp. 208. $3.00.

Normative, or welfare, economics is a very much neglected subject in this country. Outside the theories of employment and foreign trade most economic writing of the last twenty-five years has been analytical and descriptive, analyzing the behavior of business, labor, and the consumer under various types of competition and monopoly but hardly ever appraising their behavior from society's point of view. Even the standard textbooks on price theory (e.g., Boulding's and Stigler's) fail to consider the merits and shortcomings of our economic system and stop short at mere descriptive analysis. What little has been published on welfare economics is either too mathematical for the average economist to understand or is buried in a discussion of socialist economics. Reder's *Studies in the Theory of Welfare Economics*, therefore, is a welcome addition to the economist's bookshelf.

Reder starts out in Part I with a restatement of the concept of welfare (chap. i), the equilibrium conditions of attaining maximum welfare (chap. ii), the way in which perfect competition fulfils these conditions (chap. iii), and the sense in which their fulfilment is prevented by monopoly (chap. iv) and by the interdependence of different people's satisfactions (chap. v). None of this is new; and it is presented only as a starting-point for further analysis; but it is an admirably compact and rigorous statement of the accepted theory, such as cannot be found elsewhere.

Having established the principles by which to appraise welfare and having discussed them in the light of the accepted theory, the author proceeds to apply these principles to a surprisingly wide range of problems. He shows how economic welfare is affected by advertising (chap. vi), by the entrepreneur's willingness to bear risks in our economy (chap. vii), and by the individual's uncertainty concerning his economic future (chap. viii).

In Part II the author develops what may be called the dynamic theory of economic welfare. He shows that in appraising the relative merits of alternative economic policies and institutions it is not enough to compare the final equilibrium positions that they may lead to. One must also compare the merits of the paths through which these equilibria are reached. Reder develops a technique for making such comparisons. This analysis is preceded by a detailed general discussion of dynamic economics (chaps. ix–xii), which seems slightly out of place in a work on welfare economics but which contains some very interesting ideas and constitutes the best non-mathematical discussion known to this reviewer of the problems of dynamic economics. As such, this part should be invaluable to those who are unable to follow the fairly complex mathematics in which this subject is usually shrouded.

In the third, and perhaps best, part of the book the author discusses the effects on welfare of economic policies aimed at stabilizing employment. By analyzing the meaning, in terms of welfare, of the real cost incurred in, and the real gain derived from, an employment policy, the author is able to establish principles by which to choose between alternative employment policies. In this connection he discusses the cost, in terms of welfare, of carrying a public debt, the relative advantages of productive and unproductive relief programs (chap. xiv), and the possible conflict between the welfare requirements of employing resources fully and allocating them efficiently (chap. xv).

The book covers an amazingly wide range of subjects and has something new and interesting to say on almost all of them. In fact, for its small size it may contain too many ideas and deal with too many subjects. This necessarily requires much condensation, a very formal discussion, and a very high level of abstraction. The author often fails to make full use of his ideas and to emphasize the full significance of his results. Practical problems are discussed in the book; but very often they are presented more as hypothetical examples illustrating a theoretical argument than as actual problems which that argument can help to solve. The book should prove highly stimulating to the specialist but will probably find few readers

outside the relatively small circle of economic theorists. We can look forward to the further development of several ideas first presented in the work under review; and it is to be hoped that this development will be undertaken by Reder himself.

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Towards a Dynamic Economics: Some Recent Developments of Economic Theory and Their Application to Policy. By R. F. HARROD. New York: Macmillan Co., 1948. Pp. ix+168. $2.25.

Harrod can always be relied on to say something interesting, and these lectures (delivered at the University of London in February, 1947) are no exception to the rule. There are five lectures. The first, on the need for a dynamic economics, is a timely plea for a rediscovery of the classical interest in "the progress of society" and the application of more refined methods of analysis to the Smith-Ricardo-Malthus theory of economic development. In the second, on the supply of saving, he argues that saving is likely to be a fairly constant proportion of income and will not be very responsive to interest changes. This is preparatory to the central argument of the lectures, contained in the third lecture, in which he develops a variant of the savings-equals-investment identity as a tool of dynamic analysis. If we write Y = income, S = savings, I = investment, Harrod first takes the savings = investment identity in the form $I/Y = S/Y$; the ratio of investment to income he splits into two components, $G = \Delta Y/Y$ and $C = I/\Delta Y$; then, writing $S/Y = s$, we get the "Harrod identity," $GC = s$. G is a growth factor—the rate of growth of income. C is a "capital requirements" factor—the amount of investment per unit growth of income. Harrod proceeds, quite properly, to turn this *ex post* identity into an *ex ante* equilibrium equation by redefining the concepts, and then he uses it to discuss underemployment and inflation. He is perhaps overimpressed by the fact that, if s is constant, G and C must move inversely—i.e., a high rate of growth of income involves a low investment requirement. This proposition does not seem to amount to much more than saying that a rise in the denominator lowers, and in the numerator raises, the value of a fraction.

An economic identity is useful only if its components either have reasonably stable values or represent "parameters of behavior"—i.e., quantities which summarize and register some aspect of mass behavior. Harrod's identity does not seem to this reviewer to fulfil these requirements. The argument that s is stable is not at all convincing, and it is difficult indeed to see what aspects of behavior the tortured concepts G and C represent. The prime weakness of Harrod's argument is the implied stability of s. Though he indicates parenthetically that saving may depend not only on income but on the capital stock itself, he does not take adequate account of the fact that consumption is directly related to the size of the capital stock (capital being that which is consumed!). He neglects also the important relation between saving and the age distribution of the population.

The fourth and fifth lectures are on policy questions—the foreign balance, contracyclical policy, and "Is interest obsolete?" Harrod's exposition is, briefly, that it is the volume of exports rather than the foreign balance itself which is significant from the point of view of employment; that there is a real long-run "stagnation" problem in spite of the postwar inflation; and that the way to deal with it is by a combination of fiscal policy and a multiple-commodity monetary standard. It is to be hoped that Harrod's return to academic life will permit him to become acquainted with the American literature in this field, in particular with the works of Benjamin Graham, whose plans are similar to those which Harrod puts forward. The lectures are concluded by an eloquent peroration in defense of a leisured class and a plea that the euthanasia of the *rentier* should be accompanied by the abolition of the burden of death duties.

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International Control of Atomic Energy: Policy at the Crossroads: An Informal Summary Record of the Policy Developments concerning the International Control of Atomic Energy, October 15, 1946, to May 17, 1948. (Department of State Publication 3161.) Washington, D.C.: U S. Government Printing Office, June, 1948. Pp. x+251. $0.45.

The International Control of Atomic Energy: The Third Report of the United Nations Atomic Energy Commission to the Security Council.

(Department of State Publication 3179.) Washington, D.C.: U.S. Government Printing Office, July, 1948. Pp. vi+78. $0.25.

The scope of the first of these volumes is summarized as follows in its Foreword:

> The Department of State, in keeping with the objective that a democratic foreign policy should rely on an informed citizenry, presents in this volume the record of United States participation in the United Nations Atomic Energy Commission since October 1946. Together with the previous volume, entitled *Growth of a Policy*, it constitutes a full record of this Government's efforts in this field since the advent of atomic energy.

The second document listed in the heading of this review is dealt with extensively in Section XIII of the first document and need not be considered separately here.

The essence of *Policy at the Crossroads* is the exposition of the American plan for the international control of atomic energy; the history of the acceptance of a modified version of that plan by thirteen members and ex-members of the United Nations Atomic Energy Commission; and an account of the increasingly firm and clear rejection of the plan by the Soviet Union, the Ukraine, and Poland. Readers who have kept abreast of international news will find the major points of this report familiar. The contribution of these two publications consists in providing a readable and thorough summary of the history of negotiations, with a 66-page Appendix of pertinent documents.

As the State Department sees it, the problem can be reduced to fairly simple terms:

> The two-year effort of the United Nations Atomic Energy Commission has succeeded in producing a plan for a feasible and effective system of international control. In the opinion of the Commission's majority, that plan contains the only possible solution of the control problem which will meet the known scientific and technological facts of atomic energy. . . . So far the U.S.S.R. has refused to consider participation in the world community to the extent required for collective atomic security. . . . We have blazed a trail which leads to a known destination and our problem now is to get the Soviet Union to follow that trail along with the rest of us.

But suppose that in the discussion of atomic energy the United States and the other democracies had found themselves in the minority in the Security Council and that Russia and her allies had been outvoting us consistently on every important question (as Russia and her allies have actually been outvoted). Let us suppose that it was Russia who had a stock pile of atomic bombs and that we were trying frantically to find out how to catch up with her. Suppose that it had been proposed that an international agency for the control of atomic energy should be created by a United Nations in which Russia and her allies always had a decisive majority vote. This agency, set up by the Soviet-dominated United Nations, would have unrestricted inspection power to go into any plant in the United States, and, on the basis of its inspection reports, the Security Council (with its Communistic majority) would have the power to arrest American scientists, executives, government officials, and other citizens; to seize any allegedly dangerous materials or machinery; and to exercise any other controls which this authority deemed to be necessary to the security of the world. Would the United States have been willing, under those circumstances, to surrender its veto power and to accept the essence of the Russian plan?

The thirteen nations who constituted the majority in the Atomic Energy Control Commission did agree upon a modification of the American plan. Though it must be remembered that approval by the United States Senate would also have been required, this agreement points toward the practicability of international democracy between democratic nations. (As used in this review, "international democracy" means the reaching of working agreements between nations by means of consent rather than coercion.)

But the dominant nations of the Western world belong to a relatively homogeneous culture. Part of that culture is the acceptance of democratic methods of government, evolved through centuries of trial and error. Russia's conception of government has evolved out of centuries of experience with the police state, with almost no experience of democratic institutions as we know them. Moreover, the present Soviet government accepts as its basic rationalization Marxian communism (instead of the Christianity, modified by ideals of freedom and competition, which has provided the basic rationalization for Western democracy). The cornerstone of Marxian communism is the theory of the class struggle. According to that theory, no stable adjustment can be achieved until the workers throw off the tyranny of the exploiting capitalists. Since Russia regards herself as the representative of the proletariat and regards the

United States and her allies as the institutionalized expression of exploitive capitalism, the very essence of Soviet culture required the Russian leaders to regard our leaders as inveterate enemies. But once these basic attitudes are granted, Russia would be insane to accept the American plan until she was forced to do so. Even if the Marxian theory were not involved, a cynical acceptance of power-politics theories would lead to much the same conclusion.

It has been argued that the Politbureau, being realistic, must recognize that the alternative to accepting genuine international control of the atomic bomb would ultimately be destruction in an atomic war. If that were the case, it would mean that Russia was being coerced by the atomic threat. The United States, if faced by a proposal for effective control by a Security Council with an overwhelming Communistic majority, might be realistic enough to accept rather than be devastated. But such acceptance would be surrender. Moreover, the Russians may well believe that, if they can procrastinate long enough to develop atomic and bacteriological weapons of their own, they can use the immense advantage which the new destructive sciences give to the aggressor and can win the world rather than be devastated.

(At this point the reviewer wishes to place on record his personal conviction that the democratic point of view, with all its defects, is basically superior to the Communistic point of view as a basis for achieving the objectives which human beings, in general and in the long run, seek. He also wishes to record his opinion that the Russian proposals for controlling the atomic bomb have been utterly inadequate.)

Our culture being what it is, the discussions summarized in *Policy at the Crossroads* have undoubtedly been indispensable But social scientists need not share the bewilderment and frustration which many people seem to experience as a result of the failure of these negotiations. Nor should those who work out the master-plans of strategy to safeguard civilization against atomic destruction accept any longer the obviously unrealistic theory that the interchange of prolonged arguments before United Nations agencies is at all likely to solve the problem. One of the tasks which social science thus far has hardly touched is the working-out of the procedures by means of which a solution could actually be achieved.

HORNELL HART

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Die wechselseitige Konjunkturabhängigkeit von Landwirtschaft und Industrie in den USA, 1919–1941. By DR. EDUARD WYTTENBACH. Bern, Switzerland: A. Francke A.G., 1947. Pp. 250. Sw. Fr. 24.

This book contains a study of the mutual interaction between fluctuations in production and employment in agriculture and industry. The development of the American economy in the interwar period was chosen as a model. This choice was dictated by the fact that both industry and agriculture play a significant role in the American economy and that the foreign demand for certain American agricultural products is important. The first two sections of the book present introductory material and an outline of the history of American agriculture since 1910. The last two sections, which form the major part of the study, contain some references to the theory of interdependence between agriculture and industry over the cycle. A long chapter of 87 pages analyzes empirically the impact of fluctuations in agricultural output and income on the industrial sector of the economy.

The author comes to the following main conclusions: Fluctuations of agricultural production, i.e., changes between good and bad harvests, have direct and indirect effects on industrial output. The direct effects, however, appear to be relatively unimportant. Thus, changes in agricultural output directly influence demand for transportation and storage services and employment in manufacturing industries processing agricultural raw materials. Greater significance should be attached to two indirect effects of changes of agricultural output postulated by the author One is his hypothesis of the psychological impact of price changes of such basic commodities as wheat and cotton. Owing to institutional factors (highly organized and competitive markets, the publicity given to these commodities because of their significance as major cash crops of many small farmers, and, in the case of wheat, perhaps also the irrational identification of this commodity with "the daily bread"), these prices tend to influence expectations of businessmen in general. Furthermore, large harvests and accumulation of surplus stocks, accompanied by falling wheat and cotton prices, tend to induce a general "bearish" outlook. However, the author hastens to admit that this impact has only subsidiary importance and at most tends to strengthen or cushion already existing price trends. Wyttenbach sees

the second major effect of the agricultural sector on the economy as a whole in fluctuations of agricultural investment, which exercise an enhanced effect on the rest of the economy, owing to the investment multiplier. Yet, the pattern of private agricultural investment is closely tied to that of private investment elsewhere in the economy, and a significant countercyclical effect can probably be exercised only from public investment in agriculture in the form of land reclamation, soil conservation, etc.

The over-all effect of harvest fluctuations seems to be one of merely strengthening or moderating already existing trends in the economy. Since, as a rule, large harvests coincided with prosperity and bad harvests with depressions in the period under investigation, the actual pattern of mutual relationships becomes quite complex. Do the large agricultural surpluses at the peak of the cycle inject a deflationary element? Are the large returns during prosperity and the small returns during depression due solely or even chiefly to the weather and other uncontrolled influences, or are they due primarily to differences in the use of fertilizer, machinery, and labor? The book does not answer these questions; it merely raises some of them.

Wyttenbach has carefully compiled a large amount of statistical material, but he has not really shown anything which was not fairly well known before by American economists. In part this failure to explore more fully the causal connections between the various factors investigated is due to the very simple statistical methods employed. There is only a single computation of a correlation of two variables in the whole book; in all other cases relations are merely plotted on time charts. But the major reason why this book contains few new insights is the author's disregard of the recent contributions to agricultural economics in this country. His Bibliography is heavily weighted in favor of publications before 1932; he seems to know very little of the newer material. This is probably due to the deficiency of the Swiss libraries to which the author had access. Wyttenbach's material may be valuable to the European economists, for whom it was intended; but it has little value for scholars reasonably familiar with the recent American literature on the position and problems of our agriculture and its relation to cyclical fluctuations.

BERT F. HOSELITZ

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Soviet Views on the Post-war World Economy: An Official Critique of Eugene Varga's "Changes in the Economy of Capitalism Resulting from the Second World War." Translated by LEO GRULIOW. Washington, D.C.: Public Affairs Press, 1948. Pp. 125. $3.00.

The present volume is a translation of the stenographic report of the formal scholarly discussions of Eugene Varga's book held in Moscow in May, 1947. There is no more useful document available for the study of different points of view among Soviet economists in the postwar period or for the analysis of how scholarly study and exchange of views are affected by the climate of a totalitarian state.

Various newspapers and scholarly journals have considered at some length the possible political implications of this discussion and Varga's demotion. This review will confine itself, therefore, to considering the light this document throws on the central dilemma of the professional scholar in the Soviet Union. This is the dilemma arising from the necessity of accepting and upholding as virtually sacred script the writings of Marx, Engels, Lenin, and Stalin —particularly the latter, in case of any conflict of views found in the writings of this hierarchy— while simultaneously attempting to ascertain the complex web of facts in the real world and to probe their significance.

This dilemma stands out on almost every page of this discussion report. Varga, his host of opponents, and his few supporters struggle convulsively in the double system in which they find themselves. On the one hand, they quote copiously from their masters to show their orthodoxy and their opponents' heterodoxy. On the other hand, they also seek to buttress their position by an appeal to the facts. When the facts diverge from the conclusions of the sacred writings, as is not uncommon, casuistic rationalization or sheer nonsense results. Perhaps no finer example of what happens in this case can be given than to quote Varga's retort to one of his critics, who had belabored him with the Marxist theory of the capitalist state: "Take England for an example. England undoubtedly is a country of monopoly capitalism. But can we say that now, in 1947, the working class and the Labour Party do not have any influence on England's policy, that the financial oligarchy makes the whole policy?" (p. 118).

Illuminating, too, in this document is the profound misunderstanding of the non-Soviet economic system on the part of many of these

leading Soviet economists. Particularly striking is their universal inability or unwillingness to understand that production in a free-enterprise system is not anarchy but an integrated, organized whole, with millions of connections through the market mechanism. In a similar category is the fantastic belief reiterated time and again in this discussion that the United States and other capitalist countries enriched themselves in World War II. On this and several other points Varga's arguments shine through this welter of confusion like a million-candle searchlight through pitch blackness.

One characteristic of this discussion deserves special comment, however, and that is the freedom of debate permitted Varga and his detractors, although that freedom is, of course, only within the general line of the party. The idea of such open, detailed discussion of important books at meetings of economists is one that we in this country might give more consideration. The beginnings were made here by the Social Science Research Council before World War II. They should be continued.

HARRY SCHWARTZ

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Gandhi's Autobiography: The Story of My Experiments with Truth. Washington, D.C.: Public Affairs Press, 1948. Pp. 640. $5.00.

Truth, so far as one can discover from a study of Gandhi's experiments with it, is something above, beyond, and independent of, mere truthfulness—something with which one can experiment as with penicillin or atomic energy. The mystical obscurity of the author's concept of truth is aggravated by a serious dereliction on the part of the translator. Many Gujarati terms that presumably have a religious meaning are left untranslated, without even the benefit of a glossary.

Most American readers have been more interested in Gandhi's personal life and habits than in his reforms. His autobiography indicates that he felt the same way about it. More than half of the book is devoted to his struggle for self-purification, and he repeatedly tells us that this must come before a reformer can hope for success.

This may well be true in India, where holy men are held in high reverence and where a reputation for holiness is achieved by self-punishment. In this country he would merely have seemed funny and could not have achieved leadership by that method.

Gandhi was born into a family of high class distinguished for piety. All were vegetarians, and his mother was given to prayer and frequent and prolonged fasting. At the age of thirteen he was married by his parents to a girl near his own age. A wedding in his class was a formidable and costly affair and might almost bankrupt a family. To save expense, a triple wedding was arranged for him, an older brother, and a cousin. For many years thereafter he suffered tortures in his efforts to emancipate himself from the craving which he called "lust." All desires except those actually necessary for the maintenance of life weighed upon his conscience and, he felt, had to be completely rooted out of his system.

He does not actually teach the doctrine of Nirvana, but it is easy to see the influence of that idea of blessedness on his general attitude toward life and morals. Here is the greatest contrast between Eastern and Western ideas of happiness. From both points of view unsatisfied desires are sources of discomfort and also of human conflict. Emancipation from craving is, therefore, held in the East to be the way of blessedness. But there are two ways to kill desire. One is to root it out; the other is to satisfy it. One way to emancipate one's self from the craving for food is to keep one's mind on higher things; the other way is to eat.

There are religionists even in the West who teach that it is better to want little than to have much. It is a noble philosophy, but it is better suited to the overcrowded and ever hungry East than to the, as yet, bountiful West. It might make more headway in the West if its still small voice were not drowned out by the great and mighty wind of modern advertising

Two consecutive chapters of this autobiography are under the title "A Tragedy." The "tragedy" was that Gandhi was once persuaded to eat meat for a brief period. In a country which has more cattle than any other—10 million more than the United States, besides 22 million buffaloes—it seems uneconomic to abjure the eating of meat. For a time, until he developed stomach trouble, he even refused to drink milk because of the torture inflicted on cows and buffaloes in the process of extracting milk!

The significance of his struggle for self-purification through the eradication of desires will probably never be understood in America. As

St. Paul said, "Now the natural man receiveth not the things of the Spirit of God; for they are foolishness unto him." This reviewer is inclined to let it go at that.

Gandhi's reforms grew out of his deep love and sympathy for suffering humanity. This took a practical form in his willingness to share in their sufferings, as well as in their disabilities. He never actually sought martyrdom, but there is no doubt that he would have faced it with the fortitude of an early Christian if it had been necessary. His tragic death brought him an unsought martyr's crown.

His first active reform was the removal of the civil disabilities of the indentured Indian workers in South Africa. Later he espoused the cause of the poorer classes of India, working to improve the sanitation of their homes, even cleaning with his own labor their neglected latrines. In these and hundreds of other ways he showed his deep sincerity.

Without appealing to class feeling, much less to class hostility, he succeeded in making India conscious of its responsibility for the untouchables and other neglected classes—even the third-class passengers on the railroads. This was probably his greatest achievement. It puts him in the class of those few who have achieved leadership by telling people of their duties and opportunities rather than of their rights and grievances. His motto was never: "Give 'em hell."

There is nothing in the book to show that Gandhi was conscious of the bearing of the population problem on the plight of India's masses or of the futility of his reforms until their frightful fecundity was checked. In this, however, he is not more backward than many of the religious and political leaders of the Western world.

T. N. CARVER

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Review of the Co-operative Movement in India, 1939–46. Bombay: Reserve Bank of India, 1948. Pp. 111+Appendixes. Rs. 2.

In 1941 the Reserve Bank of India published a review of the co-operative movement in India, covering the period 1939–40. This was intended to be an annual publication, but because of war conditions the current review is the first to appear since the original volume.

Indian co-operatives increased their membership by approximately 80 per cent and their working capital by approximately 60 per cent in the seven-year period after 1939. Of even more significance was the shifting emphasis within the co-operative movement. Noncredit activity became relatively much more important, and there was even a decline in the total of outstanding credits (p. 4). The co-operative movement before 1939 had its major development in agriculture; but the war led to a great increase in the operations of urban co-operatives, particularly in noncredit activities (Appen. 7), with sales of goods to members increasing from Rs. 482,000 to Rs. 24,541,000. Weavers' societies, the most important of the industrial co-operatives, expanded rapidly during the war, reaching a membership of over two hundred thousand (pp. 51–54). The central and provincial governments have supported the co-operative movement by credit advances and in other ways (p. 104); but the report takes the view that the movement has reached such a stage "that it could be counted as a factor in the economic, social and political development of rural India" (p. 104).

An extended footnote on page 93 lists eleven reports on the co-operative movement made by special experts and committees between 1935 and 1940. More detailed statistics are given in a separate volume (*Statistical Statements Relating to the Co-operative Movement in India for the Year 1945–46* [Bombay, 1948]). The review and the statistical statements give an excellent summary picture of the present status of co-operatives in India and of their development in recent years.

FRANK WHITSON FETTER

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Trade Union Wage Policy. By ARTHUR M. ROSS. Berkeley: University of California Press, 1948. Pp. viii+133. $3.00.

This small volume represents one of the most important pieces of writing in many years for those who are interested in the economics of the labor market as influenced by trade-union action. Five of its six chapters have appeared in articles in substantially the same form, but their combination into a single volume will be welcomed by economists interested in labor-market research.

The title needs to be read with discrimination, as indeed does all the rest of the volume. "Trade Union Wage Policy" is not the same as "Wage Determination under Collective Bar-

gaining." Except for the last chapter, which breaks away from the general structure of the book, the primary emphasis is clearly on "policy" rather than on the economics of trade-union wage rates.

The volume is engagingly written, and it will be easy for any reader to get a synoptic view of its contents. The first chapter describes the substance of the book and lists the headings of the other five chapters. Chapter ii, "The Trade Union as a Wage Fixing Institution," "argues that the central objective of the union must be defined as institutional survival and growth" (following Bakke). In chapter iii, "The Dynamics of Wage Determination under Collective Bargaining," "this 'model' of a trade union is applied to various questions which are not explained satisfactorily by current wage theory—why the size of a wage adjustment is often more crucial than the level of the wage rate itself, why wage rates are not equalized in local labor markets, why unions strike over small differences, and so on" (p. 18). Chapter iv, "What Is a Responsible Wage Policy?" "argues that despite the substantial integration of wage structure which has taken place, even the largest bargains cover only minor segments of the economy, the employment effect of a wage adjustment is unpredictable before the fact and undecipherable after the fact; and normally the wage bargain is not regarded as a wage-employment bargain at the time it is made." Chapter v, "Union-Management Relations and the Wage Bargain," "does not attempt to weigh the influence of economic factors, but confines itself to the more political aspects of this relationship." Finally, chapter vi, "The Influence of Unionism on Earnings," seeks to set forth some new evidence purporting to show that "earnings have tended to be higher, and to increase more rapidly, in the industries in which the larger proportion of workers have been covered by union agreement" (p. 19).

A critical review of the substantive material of these individual chapters should not be made without first calling attention to the author's own reservations with respect to his conclusions. He admits, for example, that "if the central proposition of Chapter VI can be verified only imperfectly, many other propositions in this volume cannot be verified at all by statistical methods. Examples cannot demonstrate a proposition, but merely illustrate it. The fact is that among all the open questions in the study of social behavior, the great majority cannot be answered in any manner, and only a few can be penetrated by statistical analysis" (p. 19).

Allowing for such a frank statement, and keeping in mind other saving clauses which appear throughout the text,[1] it is still difficult to accept some of the assertions which seem to be based on slender evidence. It is hard to accept propositions as new scientific knowledge without more evidence than one has already refrained from calling proof. In spite of Dr. Ross's remarks, at least an approach to scientific proof is possible, and the question which an old master of investigation and teaching in physiology used to ask his students is still relevant in economics, even though in all fields it has been, and probably will continue to be, difficult to answer, "What is the evidence?"

It seems to have grown fashionable for some economists, especially those interested in labor-market analysis, to spend much effort in disposing of classical theory by substituting new doctrines with little more evidence to support them than was associated with the older theories. But theory is still theory. The error often lies in its misuse rather than in its form. It does not seem possible to escape responsibility for a search for evidence by the substitution of one unproved theory for another. The old, even if unproved, may still have some merit as a point of departure; and the new can gain little by the mere injection of novelty. Both must eventually meet the test of contributing to the understanding of the real world.

Hence the whole volume would have been better had it not been introduced by the long and, for the most part, irrelevant comments on the inadequacy of the marginal productivity theory of wages as an analysis of the effects of trade-union action. This kind of venture is almost certain to lead to the expectation of more than is to be delivered. The later admission that "the chapters are essentially a group of essays rather than a balanced theory of wage determination" (p. 12) does not make up for the lack of delivery after such an implied promise.

There are other places where attractive language, when first used, is modified by further explanation, and it is not really clear that the author recognizes that the additional explanation makes the initial expression seem incon-

[1] See, e.g., the last sentence on p. 45, the "would not presume" sentence on p. 93, the "does not necessarily follow" sentence on p. 115, the "one can only speculate" sentence on p. 125, and the closing paragraphs on p. 133.

sistent. A case in point is the statement that "the union is not a business enterprise selling labor. It is a political institution representing the sellers of labor, and there is no necessary reason to assume that it will automatically or mechanically behave in the same fashion as a profit maximizing business enterprise" (p. 22). Later Dr. Ross says: "It is the beginning of wisdom in the study of industrial relations to understand that the union, as an organization, is not identical with its members, as individuals" (p. 23). Both of these statements are probably substantially correct; but if the latter is true, the first should certainly be re-written in language which allows for the fact that, sometimes at least, "political institutions" do not even "represent" the views of their own members as "sellers of labor" and that, moreover, "business enterprise" does not always act as a "profit maximizing" machine for its own stockholders. The latter point is subsequently recognized, but the reader is left to himself to identify the initial language as being too simple because it is too broad. This failure to limit the ideas expressed to specific types of applicable situations is a serious shortcoming of the volume. Similarly, while there is some clear recognition of a variety of forms of unionism in labor markets, nevertheless the idea that "all important American trade unions should be classified as 'business unions' " (p. 10) seems to dominate the analysis. The fact that Hoxie, in creating the lable "business unionism," also pointed out the great variation in types, and that the variation has increased still more since his day, does not really penetrate into the substance of the book.

Nowhere does this seem to be clearer than in the last chapter, which in the opinion of the reviewer should have been omitted as being premature. The guarded and admittedly limited conclusions of Douglas, which seem to have been misinterpreted, have not yet been disproved by the findings of this volume. Much could be said to show that, while it is certainly true that "we have better sources of information today than were available to Douglas" (p. 115), the careful reader may want to go back and re-examine Douglas' work[2] before assuming that these earlier findings can now be discarded. It will be especially desirable to read Douglas' discussion of his sources, where he carefully points out that "union rates" are not identical in form with "Earnings in 'Payroll' Manufacturing," and to review his tabular materials in chapters vi, vii, and xiv before accepting Ross's claim that "there are no other statistics in the volume [*Real Wages*] which would lead to the conclusion, and there is no explanation of the apparent discrepancies between the tables and the text" (p. 115).

But the most serious shortcoming of Ross's final chapter, and indeed of other parts of the volume, is the failure to give adequate weight to the generally expanding character of the economy during the period 1933–45. This becomes all the more serious when attributing the wage increases in the latter part of the period to the presence of organization. The fact that the most striking changes occurred in the heavy industries making military equipment largely exempt from price control and eagerly—sometimes recklessly—competing for a shrinking labor supply is given almost no attention. That his review of the influence of unionism on wages certainly goes farther than critical logic would justify, even if all the statistical material were complete enough to be reliable, is shown by his failure to reflect seriously on the full meaning of the observation that "in a progressive economy, there is frequent occasion for wage increases and other rank-and-file benefits, which are made possible by the enhancement of productivity. Therefore it does not necessarily create an impossible situation that the union wishes to deliver at frequent intervals" (p. 111). If this is so, and it probably is, then it probably also is true that organizational growth can follow, and *result* from, rising wages as well as contribute to them. How often, under what circumstances, and how far, are questions that need to be answered before some of the conclusions of the final chapter can really be accepted.

But even if it may be correct to say that some of the volume is prematurely published, that some of its statements are inconsistent with others, that some portions might have been greatly improved by further evidence, it is also appropriate to say that the book contains so much sharp observation that it clearly ought to be required reading for anyone concerned with the study of the labor market in the economy of the United States. Some sections of the book do more to demonstrate the nature of the problem of explaining trade-union wage policy than they contribute to the explanation; but, nevertheless, these lead to more perfect understanding.[3]

[2] Paul H. Douglas, *Real Wages in the United States, 1890–1926* (Boston: Houghton Mifflin Co., 1930), pp. 75–77, 95–142, 250–311, and 562–63.

[3] See the ingenious and subtle paragraph on the distribution of an agreed upon 10 per cent wage

The author sounds numerous notes of caution which may prevent the careful reader from being entrapped by scantily supported conclusions. This is clearly a volume which will stimulate further discussion. The future harvest will be better because of the present crop.

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Liberty against Government: The Rise, Flowering, and Decline of a Famous Juridical Concept. By EDWARD S. CORWIN. Baton Rouge: Louisiana State University Press, 1948. Pp. xiii+210. $3.00.

Professor Corwin is here concerned with "liberty" as a juridical concept—that is, with the conception of liberty as implying the existence of rights beyond the control of legislation and therefore as supplying a judicially enforcible restraint upon legislative power. His opening chapters sketch concisely the European background for this peculiarly American development of the doctrine of constitutional liberty. But the main interest of the book attaches to his portrayal of the vicissitudes which have befallen the juridical conception of liberty in the course of American history.

The bills of rights of the early state constitutions defined an area out of the reach of the state: With property rights under the fire of the early state legislatures, the expansion of techniques of judicial review set in motion the process of further guaranteeing ownership against legislative interference. This process culminated in the doctrine of Vested Rights which Professor Corwin characterizes as "the most prolific single source of constitutional limitations of any concept of American constitutional law." The effect of the doctrine was to regard the impact of a law on existing property rights as the primary test of its validity. If a law was considered to impair property rights, presumptions were automatically strong against its constitutionality.

Such a doctrine soon provoked opposition. During the Jacksonian insurgency, attempts were made to restrict judicial review to whatever limited scope was assigned to it in the state constitutions More important, this period saw the community's answer to the doctrine of Vested Rights in the enlargement of the doctrine of Police Power—the notion that legislation not specifically forbidden by a written constitution, even if it affects Vested Rights, may be presumed to have been enacted in the public interest. With the Charles River Bridge case there began the long cold war between Vested Rights and Police Power, in which Vested Rights was driven for refuge to likely looking provisions of state constitutions. But, raising the shield of Due Process, Property Rights was soon able to sally forth once again in bloody battle against attempts at public regulation.

The Fourteenth Amendment opened new possibilities for the defenders of Due Process; and, in time, the Supreme Court persuaded itself that the Constitution enacted Herbert Spencer's Social Statics. Any legislation regulating normal conditions of labor was struck down in the name of Liberty against Government. The Great Depression changed all this, of course; and even before the New Deal the court had begun the task of humanizing Due Process by reading the First Amendment into the guaranties of the Fourteenth. Recent decisions have given labor's right to organize a clear priority over the cherished business demand for freedom of contract. The court at the same time has shown a new hospitality—"possibly overdone at times," comments Professor Corwin—to the claims of religious and political minorities. The juridical conception of liberty has lost its purely proprietarian connotations and has taken on a distinct tinge of equalitarianism.

It is not easy to tell how Professor Corwin views these developments. He writes with his usual distinction and wit, but also with that complicated obliquity of allusion with which lawyers tend to hide their personal opinions from mere laymen. He does remark in the Preface: "I feel that this small volume, while by no means designed to be a tract for the times, is nevertheless a very timely one"; and his title contains ominous implications. It is true that the conception of liberty as a bastion for property rights has undergone serious modifications. But, as Professor Corwin's own analysis shows, these modifications have been in the interest of establishing that equilibrium of social forces which is the best foundation for liberty; and, up to this point, these modifications have strengthened rather than weakened the right of political

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increase (p. 33), with its numerous expressions in quotations, which shows more of the groping which goes on for reasons for an inevitable decision than it presents of analysis of the real reasons once the decision is made.

opposition, which, after all, is the basic right in the whole question of Liberty against Government. From one viewpoint Professor Corwin might perhaps better have entitled his book "Property against Government."

ARTHUR SCHLESINGER, JR.
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Freedom and the Administrative State. By JOSEPH ROSENFARB. New York: Harper & Bros., 1948. Pp. xiii+274. $4.00.

In this book Rosenfarb has set himself a tremendous task of synthesis. It is divided into four sections: "The Genesis and Evolution of the Administrative State"; "Freedom and Democracy in the Administrative State"; "Labor Relations in the Administrative State"; and "Law and Government in the Administrative State." The exposition ranges, in order, over the following topics: the psychological drives of the human race, social and political history, capitalism, planning, freedom, democracy, power, labor relations, and administrative organization. It would be easy to underrate the result. The general impression is one of wordy confusion. Innumerable statements are flatly made which demand qualification, explanation, or documentation. Inconsistencies and contradictions abound. Nowhere is there any concise definition of what an "administrative" state is. When we come to specific suggestions, the author vanishes into a maze of vague clichés. Such economics as the book contains, though vital to the argument, consists only of third- and fourth-hand slogans of garbled Keynesianism.

A few samples may be given: The family (undefined) is "primordial and universal" (p. 107). "According to available information, the Ukrainian population actively collaborated with the Germans in exterminating the Jews"—tremendously important, if true, but no sign of a reference (p. 201). Human wants are "limitless" on page 3, but on page 134 the "United States has passed the production stage of economic development. We are in the distributive era." Many other striking instances might be given.

Yet, although so many unfavorable things can be said about the book, it remains both readable and worth reading. There are many nuggets of valuable information, and in its very confusion it is a faithful portrait of contemporary American left-wing liberalism, eagerly advancing in all directions at once. There is, however, more to the work than that. The second section, especially chapters xi and xiii, attains real insight and power. Rosenfarb is there dealing with subject matter (the interplay of the individual and organization) about which he has evidently thought a great deal and concerning which he would appear to have had a good deal of personal experience. The analysis of classes in terms of leadership rather than of property, the discussion of the limited scope of direct democracy and the need for leaders, the trenchant exposition of control by elimination of the few, key, opposition leaders—all this struck me as excellent.

But if a reviewer may inject a personal note, the thing most interesting to me about this book was the close similarity which it bore to my *Democracy and Progress* in its political ideas and values, coupled with the wide difference in positive programs (in so far as Rosenfarb has a discernible program). It might be worth while here to try to trace the basic points of divergence.

Like most thoughtful writers on democracy (for instance, Jefferson), Rosenfarb is driven inevitably to the emphasis on opportunity (economic or political) rather than on literal equality. Like the reviewer, he has a doctrine of the decline of the self-perpetuating, tightly organized, group. He, too, stresses the need for new ideas and new men, and he, too, emphasizes persuasion rather than coercion. Yet we should probably have a hard time of it if called upon to prepare a joint program for the future. Why is this?

The basic trouble lies in the fact that Rosenfarb does not understand the nature of the business cycle and economic instability, and he does not seem in the least to appreciate just how tight and how centralized a degree of control would be needed if we were really to attain the standard of security which he apparently sets. "It need not, however, be feared that the administrative class will become the omnipotent dictatorial class . . . there would be internal pyramids of power within it in the form of agencies in constant competition with each other" (p. 124). Not if we are to have 100 per cent security! They might be jealous, I grant him, but it would have to be the jealousy of a stalemate.

The difficulty is that in deciding what goods shall be produced (which Rosenfarb's plan and high security standard make necessary) we inevitably decide what group will hold power. It is not enough that there be opportunity to rise. There must be opportunity to rise on relatively

independent terms. Growth comes through change, and change comes through independent minds. But once Rosenfarb's state were established, it would foster the sycophant rather than the pioneer. There is an "interim ethics" of centralized planning, as there was an "interim ethics" of primitive Christianity. By "interim ethics" I mean a course of conduct satisfactory for a while but disastrous in the long run. The early Christians could "live up" their capital because they expected the world to come to an end. But the planner does not expect a parousia and ought to consider the long-run consequences of his acts. Certainly the *founding* of a new bureaucracy will give many an opportunity (Rosenfarb, p. 120), but this tells us nothing of its behavior when it is well established.

The problem of democracy and freedom is not to be solved by the putting-in of any single, dominant group. We gain virtually nothing in the long run by supplanting an oligarchy of monopolists (if such there be) by an oligarchy of proletarians. The long-run solution is the limitation and control of oligarchy. What we want is, as far as possible, a classless, a fluid society. This we cannot have if no room is left for the independent career. If business competition is no longer the answer, as Rosenfarb suggests, what real alternative has his administrative state? It would be interesting to see what would happen if to his own proposals he really applied his own values and the keenness and insights he displays in criticizing Marxism.

DAVID MCCORD WRIGHT

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British Block Grants and Central-Local Finance. By REYNOLD E. CARLSON. ("Johns Hopkins University Studies in Historical and Political Science," Series LXV, No. 1.) Baltimore: Johns Hopkins University Press, 1947. Pp. 222+xi/. $2.50.

This volume deals with central and local financial relations in Great Britain since the drastic changes introduced by the Local Government Act of 1929. It begins with a summary of the early history of local grants, sets forth the provisions of the 1929 act in some detail, evaluates the effect of this measure, and discusses subsequent legislation in this field. It includes a summary of wartime grants under emergency legislation, as well as considerable statistical material indicating trends.

The study makes it clear that the 1929 changes provided no panacea for local difficulties, even for the decade before the war. There is no evidence that the derating of industry and the increased national grants either promoted industrial recovery or offered substantial aid to distressed areas (p. 197). The reduction in the number of local authorities (from approximately nineteen hundred to approximately fifteen hundred) has not gone far enough to eliminate the small authorities with inadequate resources for the minimum acceptable local services (p. 141). Central government aid, in the pre-war period, failed to keep abreast of growth in local expenditures, so that the proportion of local government grants and rate income from grants declined (p. 166). And population shifts and the gradual transfer of public assistance from local to national support have impaired the block-grant formula as a measure of need (p. 157). In fact, the Beveridge plan may well go further than the Local Government Act of 1929 to equalize resources and services.

The war forced increased central aid, mostly on an emergency basis, and accelerated the tendency toward centralization. The author concludes that in the postwar decade the centralizing tendency will increase rather than diminish (p. 203).

The study as a whole is objective, and the conclusions are well supported by pertinent facts without being overloaded with detail. It is, in short a useful and important contribution to our knowledge in this field.

MABEL NEWCOMER

Vassar College

The Hall Carbine Affair: A Study in Contemporary Folklore. By R. GORDON WASSON. New York: Pandick Press, 1948. Pp. x+190. $6.00.

Wasson's purpose in writing this book is to prove the falsity of the widely accepted story that J. P. Morgan, Sr., made a small fortune selling condemned and dangerously obsolete firearms to the United States government during the early part of the Civil War. The result is a brilliant tour de force. Not only does the author, who is a vice-president of J. P. Morgan, Inc., prove his thesis, but he has produced a volume which is fascinating reading.

Had it not been for the subsequent prominence and fame of J. P. Morgan, the Hall car-

bine affair would have lapsed into the obscurity that the intrinsic historical importance of the subject merited. But Gustavus Myers in his *History of the Great American Fortunes* gives an account, presumably based on official records, of how Morgan and one Simon Stevens purchased five thousand condemned Hall carbines from the government arsenal in New York at $3.50 each and then sold them to General John C. Fremont in St. Louis for $22.00 apiece. Furthermore, according to Myers, when the government offered to compromise on the price at a rate of $13.31 per gun, Morgan and his associate refused, taking their claim into court, where they were awarded the full amount of the contract. Finally, it was alleged, the rifles were so bad that they shot off the thumbs of the soldiers using them.[1]

In substance this account has subsequently appeared in numerous books, articles, editorials, etc., which discuss the genesis of the Morgan fortune and has become a part of the folklore concerning American businessmen.

By a careful analysis of the official documents dealing with the case, the author shows the extent to which the true picture has been distorted. Morgan's role was that of a banker who advanced a loan of $20,000 to Simon Stevens on security, which loan appeared to be safe. He was never a principal in the transaction, and at the time the loan was made he had no knowledge of the identity of the purchaser. There was no difficulty in collecting the agreed-upon purchase price from the first half of the shipments of carbines to General Fremont. This sum was more than sufficient to repay Morgan's loan, and he took no further part in the transaction. The interest, calculated at 7 per cent, and the commission on the loan amounted to $5,556.04, which was probably sufficient to compensate for the risks involved but was hardly enough to form the foundation for the Morgan fortune. In respect to the quality of the firearms, Wasson shows conclusively that the Hall carbines, while inferior in performance to the latest type developed at the time, were not dangerous to the users and were, in fact, greatly preferred over the muzzle-loaders most widely used by both sides during the war.

Any competent scholar is aware of the dangers of drawing conclusions from a partial view of the evidence and of the necessity of checking on the competence of "authorities." Nevertheless, it is valuable to have case studies, such as this essay, as examples of how easy it is to accept as authentic careless or distorted interpretations of data.

In the concluding paragraphs of his study Wasson makes a plea for more objective analysis of business. Pointing out that "books on capitalism, on 'finance capitalism,' on the morals of big business drop continually from the presses," he states that the authors of such books ". . . have had no experience in business, and have not known personally the kind of men or world they describe. [The results are] grotesque, being fiction masquerading as history" (p. 119).

These points are well taken, but it is equally true that books on business drop continually from the presses written by authors hired by various institutions to write official histories. These authors are commonly as unfamiliar with the men and the world they purport to describe as the muckrakers. The results are all too often also "fiction masquerading as history."

This is not to imply that Wasson would hold any brief for this kind of history. But it suggests that the solution to the problem of getting objective histories is for business and industry generally to make their records available for analysis by competent scholars. Only in this way will it be possible to get an accurate picture of the way the American economy has operated during the past. This procedure involves a mutual responsibility on the part of the business community to accept the unfavorable results along with the favorable and on the part of the scholars to maintain their objectivity and to place their findings in the proper economic and cultural framework.

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[1] See Gustavus Myers, *History of the Great American Fortunes* (Chicago, 1911), III, 156–62.

BOOKS RECEIVED

Acton, Lord. *Essays on Freedom and Power*. Selected and with an Introduction by Gertrude Himmelfarb. Preface by Herman Finer. Glencoe, Ill.: Free Press, 1948. Pp. lxvi+452.

Adams, Walter, and Traywick, Leland E. *Readings in Economics: Principles and Problems*. New York: Macmillan Co., 1948. Pp. xi+520.

Anne Arundel County, Maryland: Its Economic Development and Potentials. ("Studies in Business and Economics," Vol. II, No. 1 [June, 1948].) College Park: University of Maryland, 1948. Pp. 79.

Barnes, Harry Elmer. *Historical Sociology: Its Origins and Development: Theories of Social Evolution from Cave Life to Atomic Bombing*. New York: Philosophical Library, Inc., 1948. Pp. x+186.

Belloc, Nedra Bartlett. *Wages in California: War and Postwar Changes*. Berkeley and Los Angeles: University of California Press, 1948. Pp. xii+98.

Bluemel, C. S. *War Politics and Insanity*. Denver, Colo.: World Press, Inc., 1948. Pp. 121.

Bober, M. M. *Karl Marx's Interpretation of History*. 2d ed. ("Harvard Economic Studies," Vol. XXXI.) Cambridge, Mass.: Harvard University Press, 1948. Pp. x+445.

Bonn, M. J. *Wandering Scholar*. New York: John Day Co., Inc., 1948. Pp. 403.

Catton, Bruce. *The War Lords of Washington: The Inside Story of Big Business versus the People in World War II*. New York: Harcourt, Brace & Co., 1948. Pp. 313.

Chamber of Commerce of the United States. *America and the International Trade Organization, June 15, 1948*. Washington, D.C., 1948. Pp. 101.

Chaplin, Ralph. *Wobbly: The Rough-and-Tumble Story of an American Radical*. Chicago: University of Chicago Press, 1948. Pp. vi+435.

Chew, Arthur P. *Plowshares into Swords: Agriculture in the World War Age*. New York: Harper & Bros., 1948. Pp. xv+227.

Corwin, Edward S. *Liberty against Government: The Rise, Flowering and Decline of a Famous Juridical Concept*. Baton Rouge: Louisiana State University Press, 1948. Pp. xiii+210.

Cottrell, Leonard S., Jr., and Eberhart, Sylvia. *American Opinion on World Affairs in the Atomic Age*. Princeton, N.J.: Princeton University Press, 1948. Pp. xxi+152.

Fairchild, Fred Rogers; Furniss, Edgar Stevenson; and Buck, Norman Sydney. *Economics*. 3d ed. New York: Macmillan Co., 1948. Pp. xxviii+859.

Faris, Robert E. L. *Social Disorganization*. New York: Ronald Press Co., 1948. Pp. viii+481.

Faulkner, Harold U. *American Political and Social History*. 5th ed. New York: Appleton-Century-Crofts, Inc., 1948. Pp. xxii+954.

Fischer, Ruth. *Stalin and German Communism: A Study in the Origins of the State Party*. Cambridge, Mass.: Harvard University Press, 1948. Pp. xxii+687.

Fraser, L. M. *Economic Thought and Language: A Critique of Some Fundamental Economic Concepts*. New York: Macmillan Co., 1948. Pp. xx+411.

Geren, Paul. *The Pilgrimage of Peter Strong*. New York: Harper & Bros., 1948. Pp. 229.

Graham, Herman D. *The Economics of Strip Coal Mining: With Special Reference to Knox and Fulton Counties, Illinois*. (Bureau of Economic and Business Research Bull. 66.) Urbana: University of Illinois Prsss, 1948. Pp. 77.

Hacker, Louis M.; Selekman, Benjamin M.; Seward, Ralph T.; Dickson, William J.; and Smith, T. V. *The New Industrial Relations*. Ithaca: Cornell University Press, 1948. Pp. vii+150.

Hanna, Frank A.; Pechman, Joseph A.; and Lerner, Sidney M. *Analysis of Wisconsin Income*. New York: National Bureau of Economic Research, Inc., 1948. Pp. xviii+261.

Harris, Seymour E. *The European Recovery Program*. Cambridge, Mass.: Harvard University Press, 1948. Pp. xvii+309.

Harris, Seymour E. (ed.). *Foreign Economic Policy for the United States*. Cambridge, Mass.: Harvard University Press, 1948. Pp. xiii+490.

Harrod, R. F. *Towards a Dynamic Economics*. New York: Macmillan Co., 1948. Pp. ix+168.

Hart, James. *The American Presidency in Action: 1789*. New York: Macmillan Co., 1948. Pp. xv+256.

Hayek, Friedrich A. *Individualism and Economic Order: A Critical Analysis of Socialist Economics and a Plea for the Preservation of "True Individualism."* Chicago: University of Chicago Press, 1948. Pp. vii+271.

Hertz, Frederick. *The Economic Problem of the Danubian States: A Study in Economic Nationalism*. London: Victor Gollancz, Ltd.; and New York: Transatlantic Arts, Inc., 1948. Pp. 223.

Hoadley, W. E., Jr., and Wright, C. G. *Employment, Production, and Income in the Chicago Industrial Area*. Chicago, Ill.: Research Department, Federal Reserve Bank of Chicago, 1948. Pp. vii+28.

Hoover, Edgar M. *The Location of Economic Activity*. 1st ed. New York: McGraw-Hill Book Co., 1948. Pp. xv+310.

Kerr, Clark, and Randall, Roger. *Causes of Industrial Peace under Collective Bargaining: A Study of Crown Zellerbach and the Pacific Coast Pulp and Paper Industry.* (Prepared for the National Planning Association Committee on the Causes of Industrial Peace under Collective Bargaining, Reprint No. 9.) Berkeley: Institute of Industrial Relations, University of California, 1948. Pp. xviii+78.

Killingsworth, Charles C. *State Labor Relations Acts: A Study of Public Policy.* Chicago: University of Chicago Press, 1948. Pp. x+327.

Killough, Hugh B., and Killough, Lucy W. *Economics of International Trade.* 2d ed. New York: McGraw-Hill Book Co., 1948. Pp. xiv+463.

Kimball, Janet. *The Economic Doctrine of John Gray—1799–1883.* Washington, D.C.: Catholic University of America Press, 1948. Pp. viii+162.

King, Willford I. *The Keys to Prosperity.* New York: Constitution and Free Enterprise Foundation, 1948. Pp. xvii+242.

Lewis, Cleona. *The United States and Foreign Investment Problems.* Washington, D.C.: Brookings Institution, 1948. Pp. xviii+359.

Loucks, William N., and Hoot, J. Weldon. *Comparative Economic Systems.* 3d ed. New York: Harper & Bros., 1948. Pp. xv+836.

Maxey, Chester C. *Political Philosophies.* Rev. ed. New York: Macmillan Co., 1948. Pp. xiii+712.

Meade, James Edward. *Planning and the Price Mechanism: The Liberal-Socialist Solution.* New York: Macmillan Co., 1948. Pp. xiv+130.

Milbank Memorial Fund. *International Approaches to Problems of Undeveloped Areas: Papers Presented at the Round Table on Undeveloped Areas.* (1947 Annual Conference of the Milbank Memorial Fund, November 19–20, 1947.) New York, 1948. Pp. 76.

Nicholls, William H. *Labor Productivity Functions in Meat Packing.* Chicago: University of Chicago Press, 1948. Pp. xvii+256.

Patterson, S. Howard, and Scholz, Karl W. H. *Economic Problems of Modern Life.* 4th ed. New York: McGraw-Hill Book Co., 1948. Pp. xx+782.

Pearcy, G. Etzel; Fifield, Russel H.; and Associates. *World Political Geography.* New York: Thomas Y. Crowell Co., 1948. Pp. xv+653.

Review of the Co-operative Movement in India, 1939–46. Bombay, India: Reserve Bank of India, Agricultural Credit Department, 1948. Pp. 111.

Roover, Raymond de. *The Medici Bank: Its Organization, Management, Operations, and Decline.* New York: New York University Press, 1948. Pp. xv+98.

Roover, Raymond de. *Money, Banking and Credit in Mediaeval Bruges.* (Pub. No. 51.) Cambridge, Mass.: Mediaeval Academy of America, 1948. Pp. xvii+420.

Roucek, Joseph S. (ed.). *Governments and Politics Abroad.* New York: Funk & Wagnalls Co., 1948. Pp. xii+585.

Silk, Leonard. *Sweden Plans for Better Housing.* Durham, N.C.: Duke University Press, 1948. Pp. xiv+149.

Slichter, Sumner H. *The American Economy: Its Problems and Prospects.* New York: Alfred A. Knopf, Inc., 1948. Pp. 214+ix.

Soviet Views on the Post-war World Economy: An Official Critique of Eugene Varga's "Changes in the Economy of Capitalism Resulting from the Second World War." Translated by Leo Gruliow. Washington, D.C.: Public Affairs Press, 1948. Pp. 125.

Taft, Philip. *Economics and Problems of Labor.* 2d ed. Harrisburg, Pa.: Stackpole & Heck, Inc., 1948. Pp. xx+822.

United Nations, Department of Economic Affairs. *Post-war Shortages of Food and Coal.* Lake Success, N.Y., 1948. Pp. ix+37.

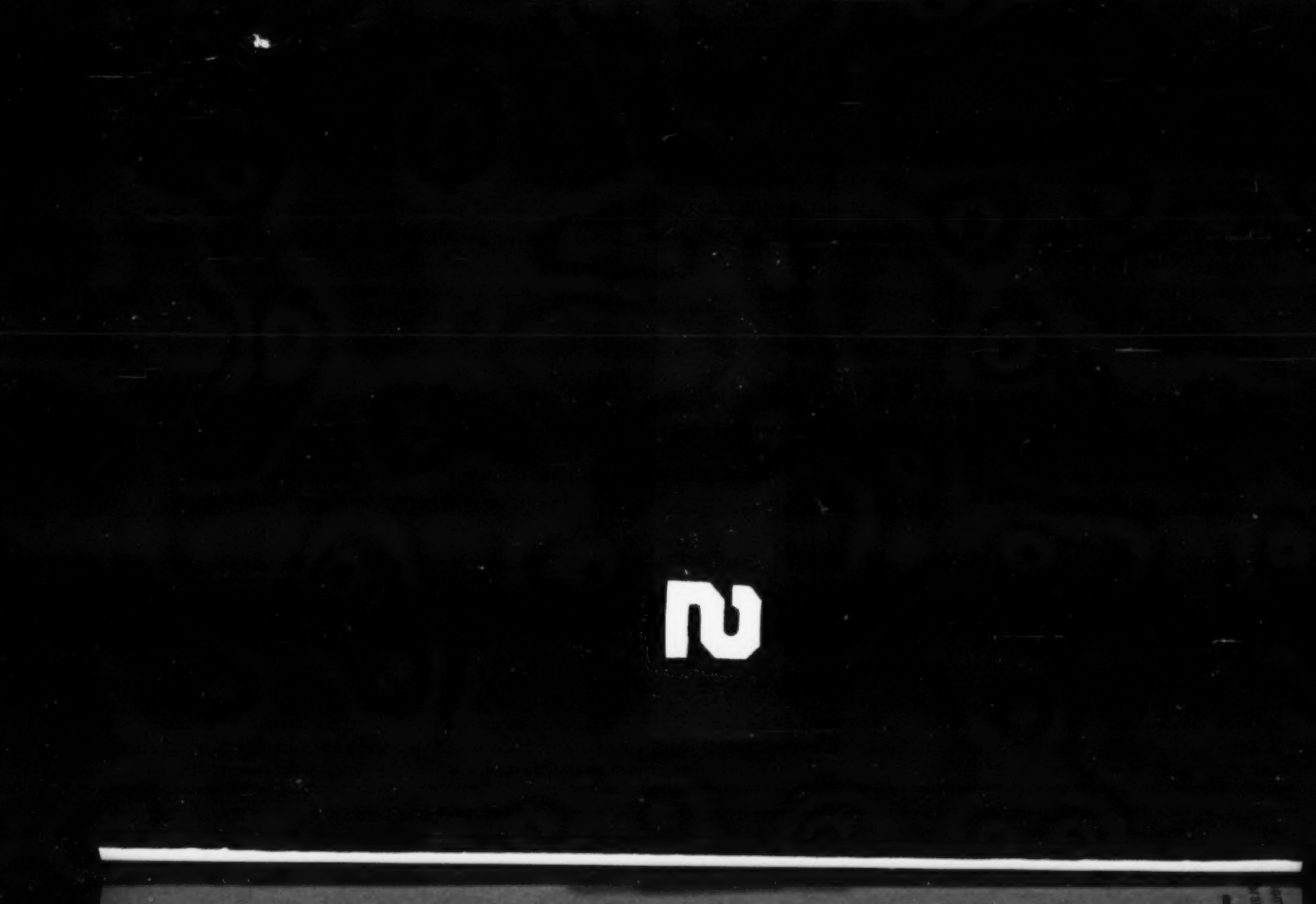
United States Bureau of Agricultural Economics. *Trends in the Tenure Status of Farm Workers in the United States since 1880.* Washington, D.C., 1948. Pp. 36.

United States Department of State. *First Report to Congress of the Economic Cooperation Administration.* Washington, D.C., 1948. Pp. viii+97.

United States Department of State. *Havana Charter for an International Trade Organization, March 24, 1948.* (Publication 3206, "Commercial Policy Series," No. 114.) Washington, D.C., 1948. Pp. 155.

United States Department of State. *Korea 1945 to 1948: A Report on Political Developments and Economic Resources with Selected Documents.* (Publication 3305, "Far Eastern Series," No. 28.) Washington, D.C., 1948. Pp. iv+124.

Ward, Barbara. *The West at Bay.* New York: W. W. Norton & Co., Inc., 1948. Pp. viii+288.

White, Leonard D. *Introduction to the Study of Public Administration.* 3d ed. New York: Macmillan Co., 1948. Pp. xvi+612.

Wright, Quincy (ed.). *The World Community: The Possibility of World Government Examined by Experts in Many Fields.* Chicago: University of Chicago Press, 1948. Pp. x+322.